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RESEARCH ARTICLE

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New macropterous leafhopper genera and species within the tribe Bonaspeiini from the Fynbos biome of South Africa (Insecta, Hemiptera, Auchenorrhyncha, Cicadellidae)

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Abstract

Two new genera of macropterous leafhoppers, tentatively included in the tribe Bonaspeiini Zahniser and Dietrich (2013) from the Fynbos biome of south-western parts of South Africa, are described. These are *Retevolatus* **gen. nov.** with type species *R. flexiverpus* **sp. nov.**, *R. semicurviverpus* **sp. nov.** and *R. subspiniverpus* **sp. nov.** and *Flavorubivolatus* **gen. nov.** with type species *F. glabriverpus* **sp. nov.** and *F. tensiverpus* **sp. nov.** and *F. curtiverpus* **sp. nov.** Collection records and distribution modelling confirmed that species of both genera occur within a confined region of south-western parts of South Africa.

Keywords

Afrotropical Region, Cape Floristic Region, phytophagous, shrub association

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Introduction

This is another contribution to the study of leafhoppers (Insecta, Hemiptera, Auchenorrhyncha, Cicadellidae) in the Fynbos Biome of South Africa. Theron (1970, 1972, 1973, 1974, 1975, 1978, 1979, 1980, 1983, 1984a, 1984b, 1986) and Davies (1987, 1988a, b; Davies and Geertsema 1998) described many species, but museum holdings and field work has revealed numerous new species. Many other new species in the South African Savanna biome with similar external appearance to these Fynbos leafhoppers requires ongoing examination of species and generic concepts. Zahniser and Dietrich (2013) placed 21 South African leafhopper genera, mostly described by Theron and Davies (op. sit.), into a new tribe Bonaspeiini. Recent additions were *Bretega* Stiller, 2016, *Discolopeus* Stiller, 2019 and *Geelus* Stiller, 2020. The majority of Bonaspeiini do not fly, i.e. have short wings, at least with reduced hind wings, with a wide range of shrub associations. They are distributed in the Western Cape Province of South Africa, generally in the Fynbos Biome and adjacent biomes such as the Succulent Karoo, Nama-Karoo and Albany Thicket Biomes. Exceptional in the tribe is the macroptery of *Renosteria* Theron, 1984a that is associated with *Dicerothamnus rhinocerotis* (Asteraceae), a wide-spread, ruderal shrub in these biomes and threatened in agroecosystems (Mucina and Rutherford 2006). Additionally, *Capeolix* Linnavuori, 1961, *Discolopeus, Geelus* and *Kimbella* Davies, 1988b have fully developed hind wings and tegmina as long as or longer than the abdomen. Male genitalia were and still are the best means of identification, with color and body shape generally not a reliable feature. The new genera described here are also macropterous, with *Flavorubivolatus* gen. nov. displaying a number of superficial similarities with *Renosteria*, but not associated with the same host plant. The other new genus, *Retevolatus* gen. nov., is distinct with overlapping distribution with the former new genus. Tribal placement of the new genera is not fully resolved due to the ambiguous definitions of Bonaspeiini and Athysanini in Zahniser and Dietrich (2013) which bear a number of similarities.

Material and methods

Numbers of examined specimens were 102 males and 74 females of *Retevolatus* and 51 males, 59 females and 14 nymphs of *Flavorubivolatus*. Dissections were made of KOH macerated specimens and examined under glycerine. Drawings were traced through camera lucida. Images were produced with Zeiss Axio Zoom V16 and Zeiss Axio Imager2 with Axiocam MRc camera. Image adjustments included crop, color brightness and contrast and unsharpen mask. Morphological terms mainly follow Blocker and Triplehorn (1985), Zahniser and Dietrich (2008) and Stiller 2016, Stiller 2019a, Stiller 2019b, chaetotaxy follows Rakitov (1997). Measurements included length from apex of crown to apex of tegmina, crown median length, crown length perpendicularly next to compound eye, pronotum length, head width across eyes, pronotum width, ocellus diameter and interocular distance between ocellus and compound eye. They were made with an eyepiece graticule, calibrated by a 2 mm scale on a microscope slide. Smallest

measurements made at 70x magnification were converted to micrometers by multiplication with 14 or to millimeters by multiplication with 0.014. Measurements of the style were the sagittal length from the apex of the apophysis to the anterior margin of the medial arm and the greatest width across the base, between the medial and lateral arms, used as a length to width ratio. Connective measurements included width of the stem at its apex, greatest width across arms, length of stem from apex to base of arms (bottom of cavity between arms) and length of arms from apex of arms to bottom of cavity between arms. Measurements of the subgenital plate were the width at the base (confluence of subgenital plate and valve) and the length medially from the base to the apex. The crown angle, in part, at the apex of the head was calculated by trigonometry, specifically tangent, using crown median length and half head width across eyes, as adjacent and opposite sides of a right-angled triangle, and doubled for both sides. In the lateral view of the aedeagus the curvature was calculated as the angle subtended by its arc, using segment height and chord length of the arc in an online calculator (circular segment, online calculators, https://planetcalc.com/1421/; accessed 04/08/2020).

Holotypes are deposited in **SANC** (The National Collection of Insects, Pretoria, RSA, same address as author address). Representatives of long series of paratypes will be deposited in the **BMNH** (The Natural History Museum, London, UK), **INHS** (Illinois Natural History Survey, Campaign, Illinois, USA) and SANC.

Distribution analysis was done in Diva GIS and MaxEnt (Phillips et al. 2020) with *Retevolatus flexiverpus* sp. nov. and *Flavorubivolatus glabriverpus* sp. nov. For the analysis, distribution files were comma separated values, 19 bioclimatic worldclim (https://www.worldclim.org/) variables and 10 percentile training presence. Maps in Fig. 18A, B were compiled with DIVA GIS (methods in Scheldeman and Van Zonneveld 2010). Distribution data in Appendix I.

Results

***Retevolatus* gen. nov.**
http://zoobank.org/81FAE41D-B7E3-4E1D-A58A-55DD586D1977
Figures 1–9

Type species. *Retevolatus flexiverpus* sp. nov. by present designation.

Diagnosis. Male and female elongate, macropterous, 5.0–6.0 mm long, with brown to dark brown vermiculous or irrorate color pattern on tegmina, crown apically with paired rhomboid or amorphous dark brown markings (Figs 1A–I, 2A–C), in lateral view with margin at crown rounded, above submargin and disc, disc flat (Fig. 1C). Crown narrowly rounded to face, anterodorsal margin shagreened. Male subgenital plate with uniseriate lateral macrosetae (Figs 6H, 8I, 9H). Pygofer lobe either with serrate posterior process variable in shape and orientation or acute subapical or basal process. Aedeagus with shaft tubular, curvate, concave, with single apical (Figs 6A, B, 8A) or subapical process (Fig. 9A), directed anteriad or dorsoanteriad. Female with sternite 7 with shallow (Fig. 9J) or deep, wide V-shaped (Fig. 6M, N) or globular notch (Fig. 8J).

Figure 1. Habitus of *Retevolatus flexiverpus* gen. nov. & sp. nov. specimens from selected localities **A** dorsal, Klipheuwel, male **B** dorsal, Piketberg, female **C** lateral, Piketberg, female **D** dorsal, Cedarberg, female **E** dorsal, Driehoek farm, female **F** dorsal, Klipheuwel, male **G** dorsal, Brakwater, head, pronotum and scutellum, male **H** dorsal, Klipheuwel, male **I** dorsal, Citrusdal, male. Scale bars: 1 mm (**A–F, H, I**), 0.5 mm (**G**).

Male and female. Color. Base color ochraceous to stramineous. Crown with paired rhomboid or amorphous dark brown markings at apex (Figs 1A–I, 2A–C). Pronotum with light brown and dark brown markings, variable in size and shape (Figs 1A–I, 2A–C). Scutellum with light brown scutellar triangles, medially stramineous with dark

brown paired markings and brown suture (Figs 1A–I, 2A–C). Tegmina uniformly reticulate and irrorate, costal cells and fourth apical cell sometimes with dark brown markings; vannal cells at margin variable, sometimes unmarked (e.g. Figs 1E, 2A) or whitish (e.g. Figs 1A, H, 2C). Legs ochraceous to stramineous; subapical brown, irregular band on pro- and meso-femur; metafemur with brown longitudinal line at apex; all tibia with areola of setae embrowned.

Measurements. All specimens of all species. Length from apex of crown to apex of tegmina 4.97–6.00 mm. Crown length medially 0.37–0.45 mm. Crown length next to eye 0.30–0.35 mm. Pronotum length 0.56–0.65 mm. Head width across eyes 1.33–1.53 mm. Pronotum width 1.24–1.43 mm. Ocellus diameter 46.3–61.1 μm; interocular distance 83.8–107.8 μm. Crown angle 117.0–122.9°.

Wings. Tegmina with four apical cells; outer and central anteapical cells, inner anteapical cell and inner discal cells merged (Fig. 7L). Hind wing with vannal lobe large, greatest length 0.4 times greatest width of hind wing, four apical cells (Fig. 7M).

Profemur. Anteromedial margin with basal AV setae short, 10–12 spine-like; intercalary setae disjunct without AV_1 differentiation, 9–11, subapical AM_1 longer and thicker than any setae in IC.

Metatibia. Setal formula at apex 2+2+1; apical pair subequal, shorter than long median seta, median setae with one very long and the other very narrow and about half as long. Basal seta subequal to long median seta.

Metatarsi. Metatarsus 1 apex with four rounded platellae and one acute platella; metatarsus 2 apex with two lateral acute and two medial, rounded platellae.

Abdominal apodeme. Anterior abdominal apodeme with variable median lobes, rounded to angular, contiguous or separate. Lobes smaller in the female anterior apodeme.

Male. Genitalia. **Anal tube.** Incised about half way into pygofer. Rectangular laterally, conical or rectangular in dorsal view (Figs 6J, K, 8E, G, 9F, G).

Pygofer. About as long as wide; fold straight to sublinear basally at about 45°, extended deeply into pygofer; anterior apodeme narrow. Process either at apex of pygofer lobe (Fig. 6K), or process at base of pygofer or subbasally on pygofer (Figs 8F, 9G, I, respectively).

Pygofer lobe. Pygofer lobe distinguished posteriad of point of articulation of anal tube and pygofer. Shape rounded or acute, with dorsal or ventral margins rounded or straight. Desclerotized, lobe-like process either absent (Fig. 7A–K), or mediad of pygofer process (Fig. 8H) or obscured mediad of desclerotized lobe apex (Fig. 9I); sclerotized pygofer process variable in shape, origin and orientation as follows:

1. Process apical, compressed, variably serrate or denticulate, posterior margin concave or straight, symmetrical or asymmetrical (Figs 6K, 7A–K), sometimes damaged (Fig. 7A, E, K).

2. Process ventro-basal, in lateral view concave, orientation dorsoposteriad, acuminate, tubular (Fig. 8F, G).

3. Process subapically on ventral margin directed posteriad, acuminate, sublinear, tubular (Fig. 9G, I).

Subgenital plate. Right-angled elongate triangular, 2.9–3.7 times longer than width at confluence of valve and subgenital plates. Macrosetae uniseriate, marginal (at apex) to submarginal (at base), 7–15, variable in number between left and right sub-

Figure 2. Dorsal habitus of *Retevolatus subspiniverpus* gen. nov. & sp. nov. specimens from selected localities and similar looking species of Deltocephalinae **A–C** *R. subspiniverpus*: **A** Nuwerus, male, unmarked tegmina **B** Nuwerus, male, marked tegmina **C** Nuwerus, female **D–E** undetermined and unplaced genus and species: **D** Biesiesfontein, male **E** Anenous Pass, female **F–J** Deltocephalinae: **F** Kaapsehoop, female, *Dagama* sp. **G** Kaapsehoop, male, *Dagama* sp. **H** Renosterpoort, female, indet. Selenocephalini **I** Buzzard Mountain, female, indet. Selenocephalini **J** New Agatha, male, indet. Selenocephalini. Scale bars: 1 mm (**A–L**).

genital plate (Figs 6H, 8I, 9H). In lateral view apical third curved (Fig. 9G) or angled dorsad (Fig. 8G) or apex very short, angled dorsoposteriad (Fig. 6K).

Valve. Posterior margins straight, acute (Fig. 6H) or obtuse (Figs 8I, 9H); lateral margins sublinear, acute; anterior margins sinuous.

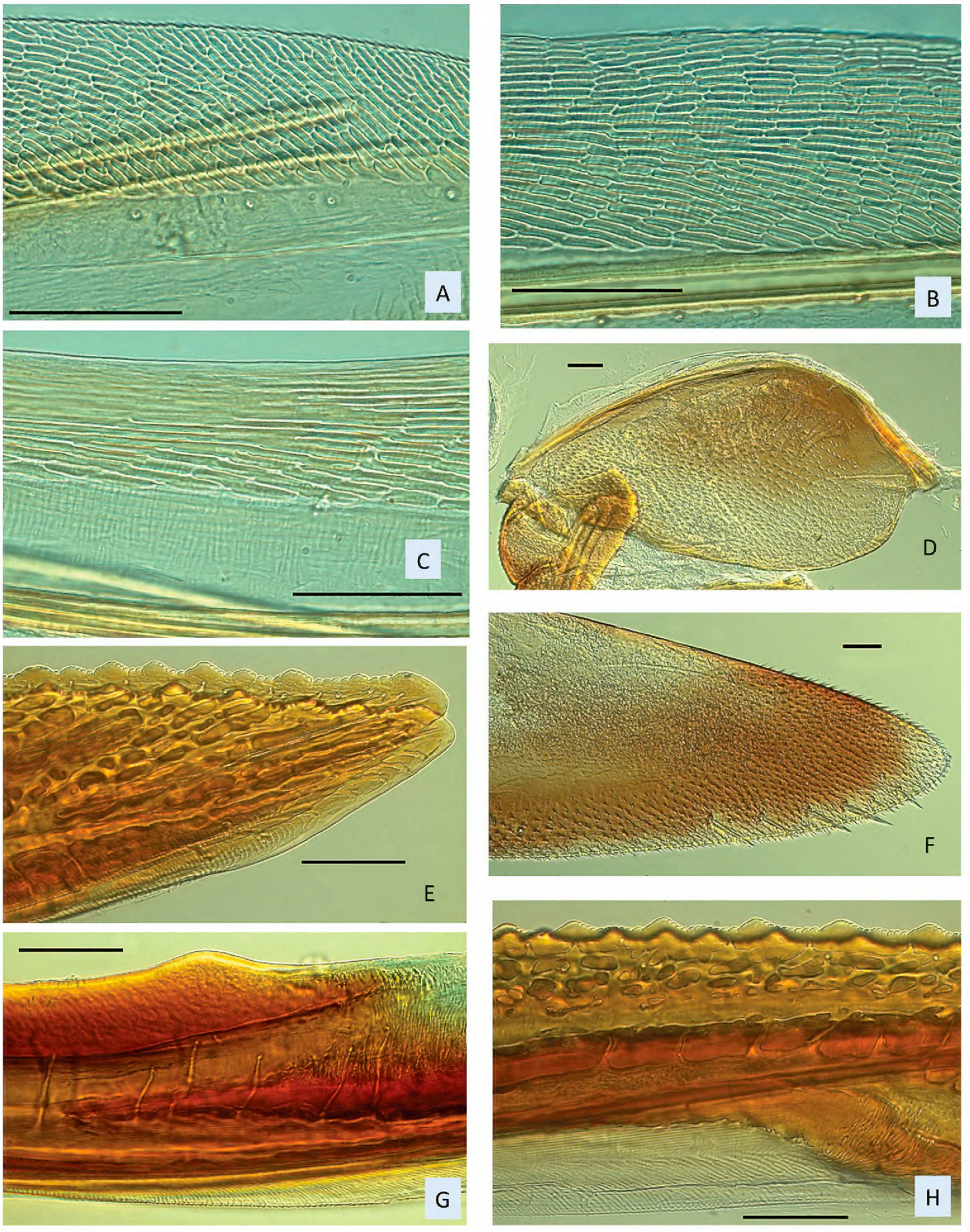

Figure 3. *Retevolatus flexiverpus* gen. nov. & sp. nov. detail of ovipositor **A** valvula 2, subapex, Citrusdal **B** valvula 2, midsection, Citrusdal **C** valvula 3, base, Citrusdal **D** valvifer 1, Citrusdal **E** valvula 2, apex, Piketberg **F** valvula 3, apex, Citrusdal **G** valvula 2, subbase, Piketberg **H** valvula 2, midsection serration, Piketberg. Scale bars: 0.05 mm (**A–H**).

Aedeagus. Dorsal apodeme short (up to one third of shaft); preatrium if present very short; shaft narrowly (Figs 6A–C, 9A) or widely concavely curvate (Fig. 8A); shaft either with apex with right-angled, single, orientation anteriad, (Fig. 6A–C) or

acutely angled (Fig. 8A), long or short process, or subapex with single, anteriad process (Fig. 9A); gonopore either on posterior margin of shaft (Fig. 6A–C, 6K), subapically, basad of recurved process, oblique (Fig. 6A–C, E, F anterior, Fig. 8A, B, ventral), or incised at apex (Fig. 9A, B).

Style. Elongate, with elongate apophysis; length to width ratio 3.1–3.7 (ratio length from apex of apophysis to apex of medial arm (sagittal plane) to greatest width across base). Width across preapical lobe slightly wider than width at base of apophysis (Figs 6I, 8D, 9E).

Connective. Y-shaped, with narrow, Y-shaped sclerotized frame with arms and stem equidistant, desclerotized region at base of arms, arms narrow (Figs 6G, 8C, 9C), straight in lateral view (Fig. 9D).

Female. Genital capsule. Sternite 7. Transversely rectangular (0.6–0.8 times longer than wide), with deep (depth 0.5–0.6 times greatest length of sternite 7) (Fig. 6M, N) or shallow (depth 0.4–0.5 times greatest length of sternite 7) V-shaped excavation (Figs 6L, 9J). Excavation in *R. semicurviverpus* sp.nov. semi-circular (Fig. 8J).

Valvifer 1. Broadly rounded dorsal and ventral margins, anterior margin obtuse or rounded, posterior margin acute, sometimes angled medioposteriad, commonly posteriad; longer than wide or as long as wide (Figs 3D, 4A, B, F, 5B, 6O–R, 8K, L, 9K, L). Dorsal margin narrowly right-angled mediad. Valvifers joined membranously at anterodorsal margin.

Valvula 1. Curvate, lanceolate (Figs 4D, 5A). Sculpture strigate (Figs 3A–C, 5C, D).

Valvifer 2. As in Fig. 4J.

Valvula 2. Apical third serrate (Figs 4E, 5E), with fine teeth in trough (Figs 3E, H, 4G, H, 5G), short protrusion dorsomedially (Figs 3G, 5E).

Valvula 3. Shape in all species as in Fig. 4K; single row of macrosetae submarginally near apex (Figs 3F, 4C, I, 5F), commonly 4–5, rarely three or six.

Etymology. Named for the net-like color pattern of the tegmina, in Latin, and verb in apposition. Net, *rete*, and flying, *volatus*, for functional wings. Gender masculine.

Discussion. This new genus is recognized by its color pattern, size and configuration of the male and female genitalia. The genus is tentatively placed in Bonaspeiini as it does not share all the features of the tribe. Similar color patterns to that of the new genus are found in the following genera of other tribes: *Libengaia* Linnavuori, 1969 (Opsiini), *Dagama* Distant (Fig. 2F, G), *Allophleps* Bergroth, 1910 (see Webb and Viraktamath 2017), *Houtbayana decemnotata* Linnavuori (Athysanini), an unknown and unplaced genus and species with elongate crown (Fig. 2D, E), undetermined Selenocephalini (Fig. 2H–J) and even in some *Discolopeus* Stiller, 2019 species (Bonaspeiini) have a resemblance in marking at the apex of the crown. One male specimen of an unknown species of the new genus was examined, which suggests additional species of the genus are still to be found and described. This specimen has widely curvate style apophysis, oriented mediad, connective similar to that of *R. semicurviverpus* sp.nov. and *R. subspiniverpus* sp.nov., and the aedeagus very short, thickened, basal paired process and lateral denticulation. Externally the specimen resembles the three new species of *Retevolatus* described here.

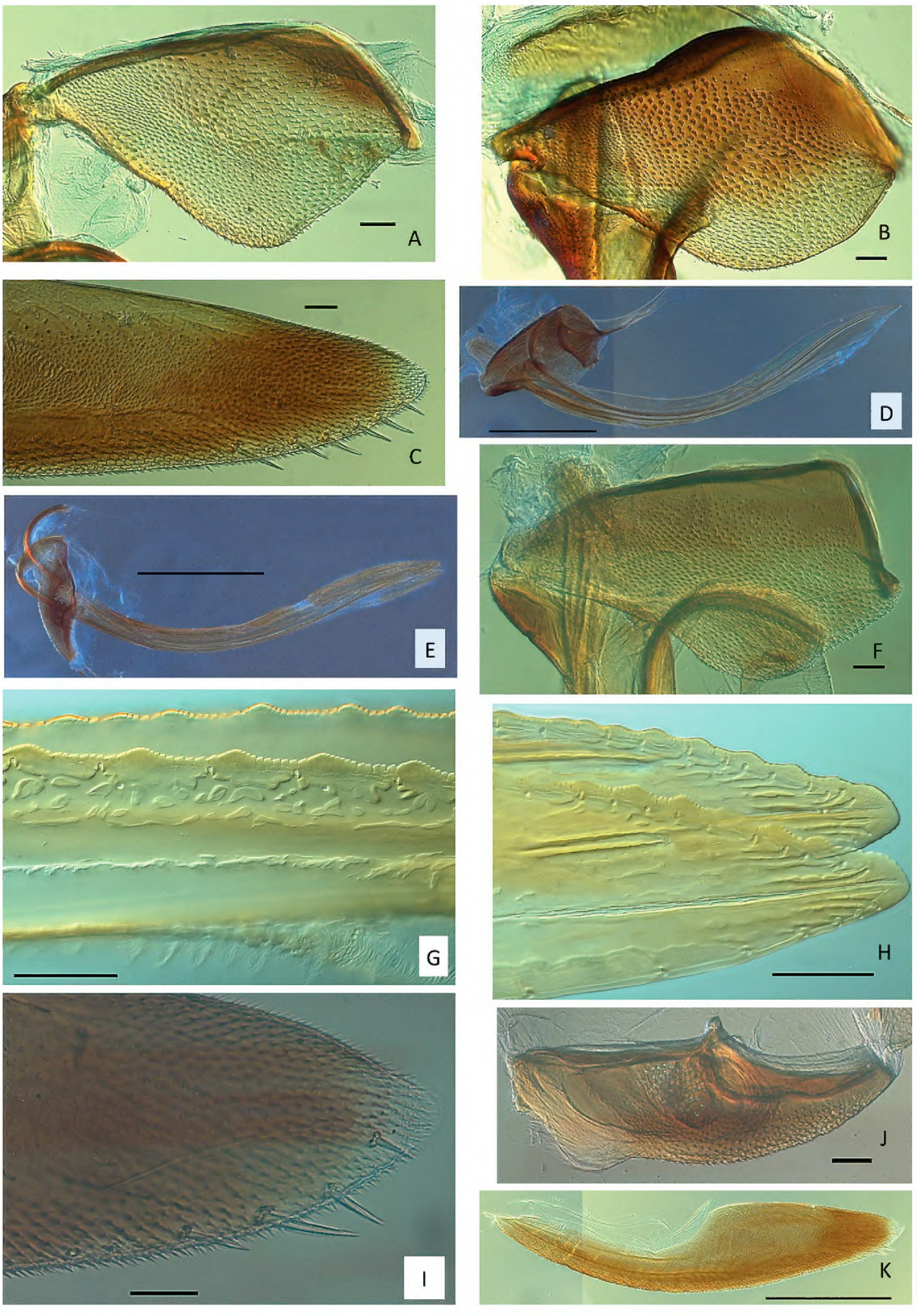

Figure 4. *Retevolatus* gen. nov. & sp. nov. detail of ovipositor **A–C** *R. flexiverpus* sp. nov. **A** valvifer 1, specimen #92, Garies **B** valvifer 1, specimen #99, Garies **C** valvula 3, apex, Garies **D–K** *R. semicurviverpus* sp. nov. detail of ovipositor, specimens from Biesiesfontein **D** valvula 1 **E** valvula 2 **F** valvifer 1 **G** valvula 2, midsection serration **H** valvula 2, apex, serration **I** valvula 3, apex **J** valvifer 2 **K** valvifer 3. Scale bars: 0.05 mm (**A–C**, **F–J**); 0.5 mm (**D–E**, **K**).

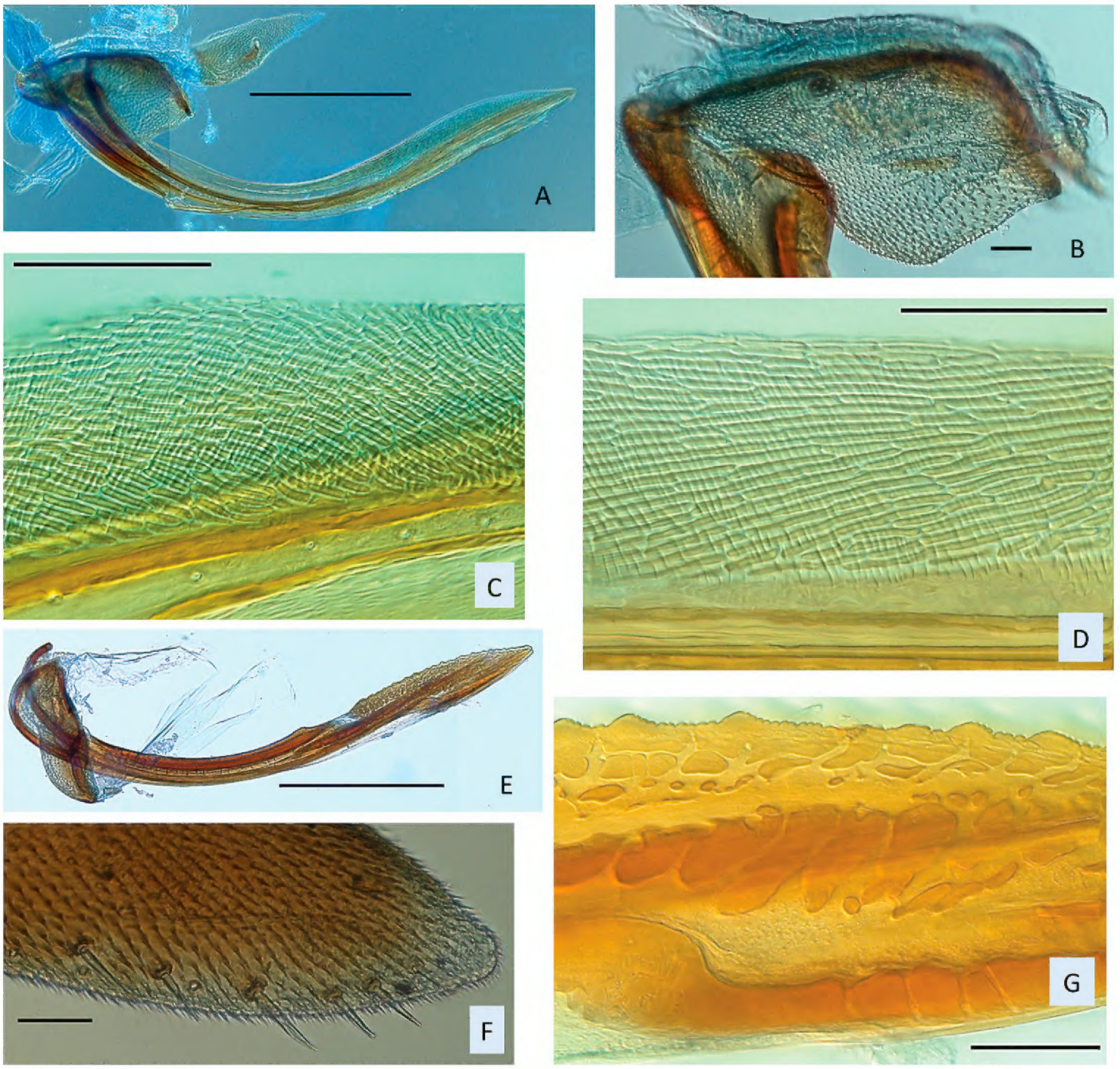

Figure 5. *Retevolatus subspiniverpus* gen. nov. & sp. nov. ovipositor, specimen from Nuwerus **A** valvula 1 **B** valvifer 1 **C** valvula 1, sculpture, subapex **D** valvula 1, sculpture, midsection **E** valvula 2 **F** valvula 3, apex **G** valvula 2, sculpture, midsection. Scale bars: 0.5 mm (**A**, **E**); 0.05 mm (**B–D**, **F**, **G**).

Key to *Retevolatus* gen. nov. males.

1 Male with pygofer with apical, short, transverse process, process variable with long or short serrations or teeth, rectangular or square (Figs 6K, 7A–K); aedeagus strongly curvate, apex with process, broken in some specimens, variable in length (Fig. 6B–D); style apophysis straight (Fig. 6I)..... ..... ***R. flexiverpus* sp. nov.**

1` Male with pygofer with basal (Fig. 8G) or subapical (Fig. 9G) tubular, acuminate process; aedeagus variably curvate, process apical (Fig. 8A) or subapical (Fig. 9A), broken in some specimens, style apophysis curvate (Fig. 8D) or straight (Fig. 9E)..... **2**

2 Male with pygofer with process origin basal (Fig. 8F, G); aedeagus with apical process (Fig. 8A), broken in some specimens, aedeagus weakly curvate (Fig. 8A); style apophysis apex curved laterad (Fig. 8D) ..... ***R. semicurviverpus* sp. nov.**

2` Male pygofer with process origin subapical (Fig. 9G, I); aedeagus in lateral view strongly curvate, process subapical, broken in some specimens (Fig. 9A); style with apex straight (Fig. 9E) ..... ***R. subspiniverpus* sp. nov.**

***Retevolatus flexiverpus* sp. nov.**

http://zoobank.org/F9B77C2F-40F0-4B7E-B406-B012296C6128

Figures 1A–I, 3A–H, 4A–C, 6A–R, 7A–M

Material examined. Type locality: Republic of South Africa, Western Cape Province, Piketberg, -32.90, 18.75, 26 Oct. 1971, J.G. Theron leg.

Type specimen. Holotype male, pinned, with genitalia in a separate microvial. Original label: "South Africa, Piketberg 26-10-71, J.G. Theron" "SANC Pretoria Dbase CCDL27850 (blue paper)".

Paratypes. 57♂♂, 48♀♀

South Africa • 1♂; Western Cape Province, between Citrusdal and Clanwilliam, Olifants River; -32.36, 18.95; 15 Oct.1931; SANC Pretoria Dbase CCDL27849.

South Africa • 16♂♂, 4♀♀; ibid. holotype. BMNH, INHS.

South Africa • 6♂♂, 5♀♀; Western Cape Province, Citrusdal; -32.6, 19.05; 9 Nov. 1971; F. Honibal leg.; SANC Pretoria Dbase CCDL27847.

South Africa • 1♀; Western Cape Province, Agter Witsenberg, Slagboom farm; -33.23, 19.26; 6 Jan. 1973; J.G. Theron leg.; SANC Pretoria Dbase CCDL27842.

South Africa • 2♂♂, 2♀♀; Western Cape Province, Citrusdal; -32.6, 19.05; 5 Nov. 1973; F. Honibal leg.; SANC Pretoria Dbase CCDL27848.

South Africa • 3♂♂, 1♀; Western Cape Province, Gouda; -33.31, 19.03; 30 Oct. 1974; J.G. Theron leg.; SANC Pretoria Dbase CCDL27845.

South Africa • 3♂♂; Western Cape Province, Hermon; -33.43, 18.96; 30 Oct. 1974; J.G. Theron leg.; SANC Pretoria Dbase CCDL27846.

South Africa • 9♂♂, 7♀♀; Western Cape Province, Klipheuwel; -33.56, 18.7; 24 Nov. 1974; J.G. Theron leg.; *Maytenus heterophylla*, Celastraceae; SANC Pretoria Dbase CCDL27853. BMNH, INHS.

South Africa • 1♂, 11♀♀; Western Cape Province, Garies Kamiesberg; -30.46, 18.13; 15 Oct. 1976; J.G. Theron leg.; SANC Pretoria Dbase CCDL27854.

South Africa • 7♂♂, 6♀♀; Western Cape Province, Clanwilliam Cedarberg; -32.5, 19.25; 21 Dec. 1976; J.G. Theron leg.; SANC Pretoria Dbase CCDL27844. BMNH, INHS.

South Africa • 2♂♂, 2♀♀; Western Cape Province, Darling; -33.37, 18.38; 18 Dec. 1981; J.G. Theron leg.; SANC Pretoria Dbase CCDL27843.

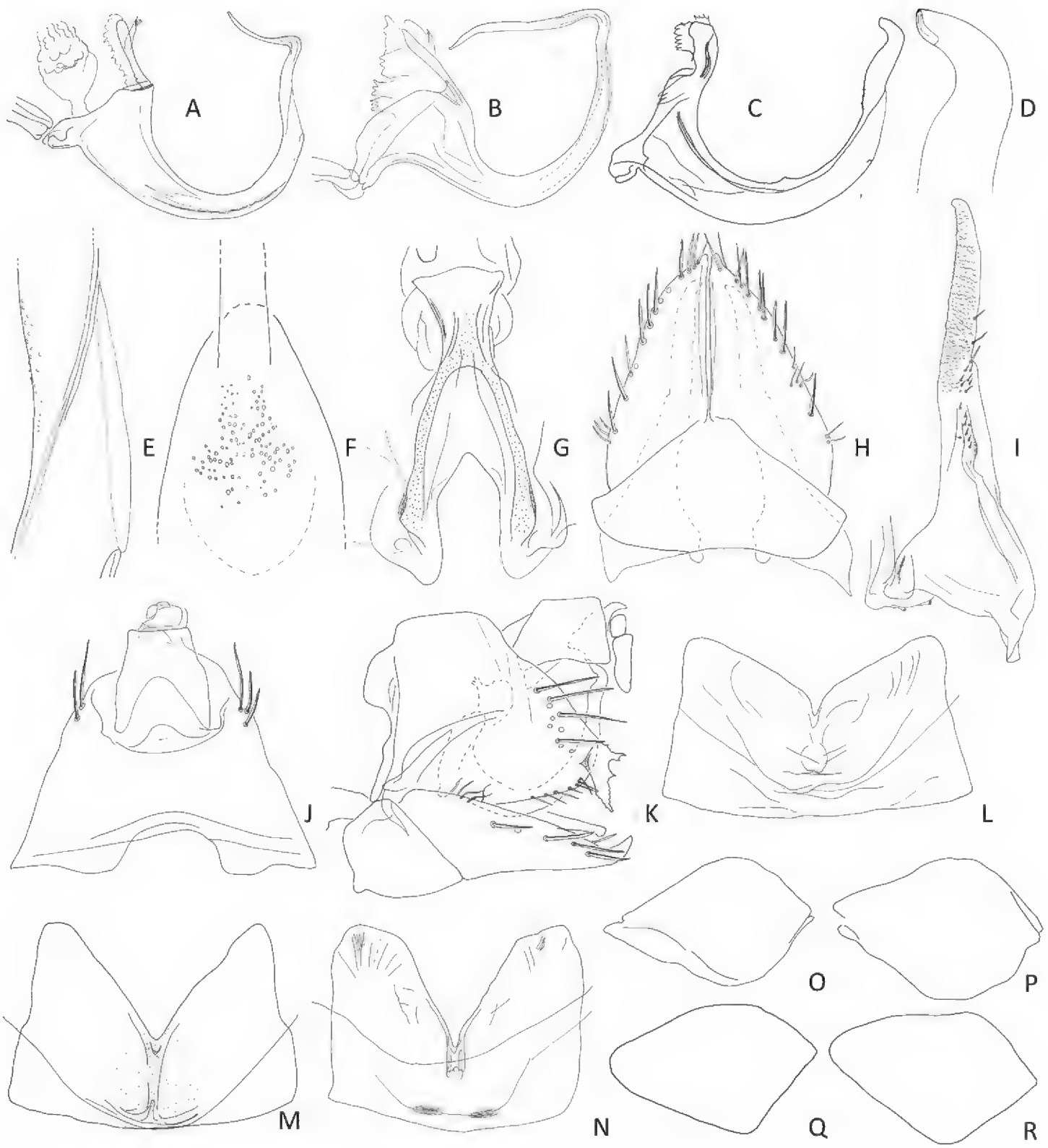

Figure 6. *Retevolatus flexiverpus* gen. nov. & sp. nov. male genitalia and female ovipositor **A** aedeagus, lateral, Brakwater **B** aedeagus, lateral, Garies **C** aedeagus, lateral, Ceres **D** aedeagus, apex, Ceres **E** aedeagus, gonopore, lateral, Ceres **F** aedeagus, gonopore, anterior, Ceres **G** connective **H** style **I** subgenital plate **J** pygofer, Clanwilliam **K** pygofer, Clanwilliam **L** sternite 7, Garies **M** sternite 7, Piketberg **N** sternite 7, Garies **O** valvifer 1, left, Garies, specimen #99 **P** valvifer 1, right, Garies, specimen #99 **Q** valvifer 1, left Garies, specimen #92 **R** valvifer 1, right, Garies, specimen #92.

South Africa • 2♀♀; Western Cape Province, Wiedouw farm base of Gifberg Pass; -31.733, 18.766; 3 Oct. 2002; M. Stiller leg.; *Salvia lanceolata*, Lamiaceae; SANC Pretoria Dbase CCDL18349.

South Africa • 1♂; Western Cape Province, Wiedouw farm base of Gifberg Pass; -31.733, 18.766; 3 Oct. 2002; M. Stiller leg.; *Diosma hirsuta*, Rutaceae; SANC Pretoria Dbase CCDL18350.

South Africa • 1♀; Western Cape Province, Wiedouw farm base of Gifberg Pass; -31.733, 18.766; 3 Oct. 2002; M. Stiller leg.; *Phylica oleifolia*, Rhamnaceae; SANC Pretoria Dbase CCDL18351.

South Africa • 1♂; Western Cape Province, Wiedouw farm base of Gifberg Pass; -31.733, 18.766; 3 Oct. 2002; M. Stiller leg.; sweeping trees and shrubs at night, *Passerina truncata* subsp. *truncata*, Thymelaeaceae; SANC Pretoria Dbase CCDL18352.

South Africa • 5♂♂, 6♀♀; Northern Cape Province, Oorlogskloof, Brakwater; -31.465, 19.079; 17 Dec. 2016; M. Stiller leg.; *Diospyros austro-africana*, Rhamnaceae; SANC Pretoria Dbase CCDL27851. BMNH, INHS.

Diagnosis. Male aedeagus with shaft narrowly curvate, C-shaped, at apex with single, right-angled anteriad, sclerotized process (Fig. 6A–C); gonopore posteriad, basad of apogee; anteriad surface opposite gonopore minutely denticulate (Fig. 6E, F). Style apophysis straight (Fig. 6I). Connective short, ratio length to width 2.2–2.7, stem length to arm length 1.1–1.6 (Fig. 6G). Pygofer process apical, transversely rectangular or square with variable denticulation and serration (Figs 6K, 7A–K). Female sternite 7 with V-shaped notch (Fig. 6L–N).

Male. Measurements. n=58. Length from apex of crown to apex of tegmina 5.15–5.67 mm. Length from apex of crown to apex of abdomen 3.78–4.26 mm. Crown median length 0.39–0.43 mm. Crown length next to eye 0.30–0.34 mm. Pronotum length 0.58–0.63 mm. Head width across eyes 1.35–1.46 mm. Pronotum width 1.25–1.36 mm. Ocellus diameter 47.0–61.6 μm; interocular distance 82.7–100.5 μm. Crown angle 117.4–122.3°.

Genitalia. Pygofer lobe. Macrosetae dorsomedially (Fig. 6K). Margins rounded or straight. Apex with compressed, sclerotized process; transversely or longitudinally rectangular, process with large or small teeth or denticles, symmetrical or asymmetrical, orientation mediad or posteriad (Figs 6K, 7A–K). Pygofer lobe without desclerotized median lobe, rounded lobe ventrad of process (Fig. 7A, D, E, G, H, I, J).

Subgenital plate. Length to width 1.5–1.8 times longer than width at confluence of subgenital plate and valve. Macrosetae varying by 1–3 macrosetae between left and right side, 5–12 macrosetae (Fig. 6H). Apex of style near apex of subgenital plate (Fig. 6H).

Aedeagus. Dorsal apodeme digitate, reflexed anteriad (Fig. 6A, B) or dorsad (Fig. 6C); preatrium short (Fig. 6A–C); apex of shaft reflexed anteriad, right-angled, slightly sinuous or sublinear, variable in length and shape (Fig. 6A, B), variable in length, commonly 0.1–0.2 times as long as vector length of shaft from apex of apogee to apex of preatrium. One specimen from Garies with very long reflexed process (Fig. 6B), 0.5 times as long as vector length of shaft from apex of apogee to apex of preatrium; apex broken in other specimens, i.e. all males from Ceres (Fig. 6C, D) and Darling. Shaft narrowly curvate, angle subtended by arc 91.1–146.2°, anterior margin below apogee with fine denticulation (Fig. 6E, F).

Connective. Short, ratio of length to width 2.2–2.7; stem length to arm length 1.1–1.6 (Fig. 6G).

Style. Apophysis straight (Fig. 6I), length of apophysis 0.4 times greatest length through sagittal plane; apex of apophysis attaining apex of subgenital plate (Fig. 6H).

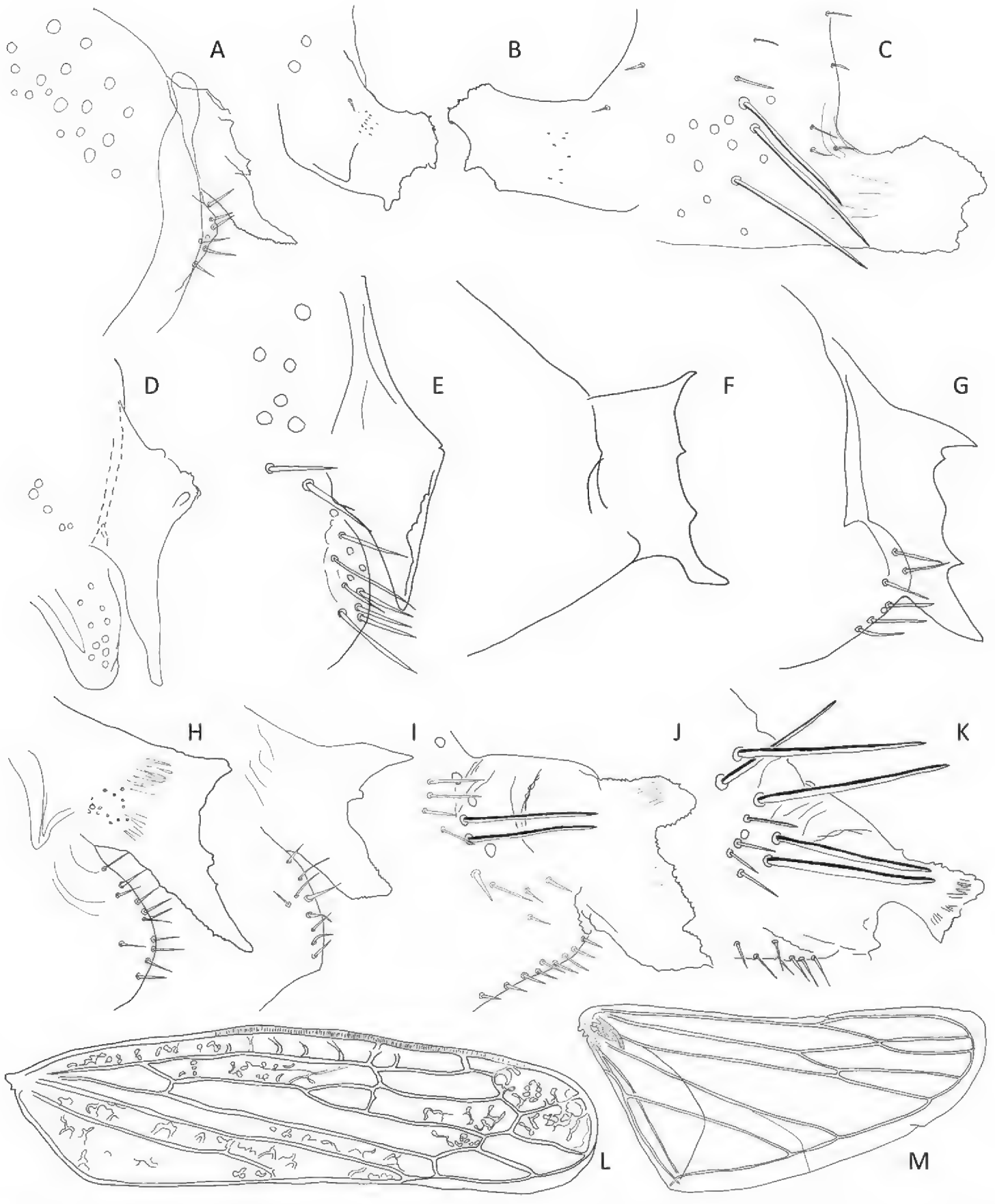

Figure 7. *Retevolatus flexiverpus* gen. nov. & sp. nov. male pygofer lobe, shape of process and wings **A** Darling, lateral **B** Brakwater, caudal **C** Wiedouw, lateral **D** Ceres, lateral **E** Ceres, lateral **F** Piketberg, lateral **G** Hermon, lateral **H** Klipheuwel, lateral **I** Klipheuwel, lateral **J** Garies, lobe 1, lateral **K** Garies, lobe 2, lateral **L** tegmina, Brakwater, male **M** hind wing, Brakwater, male.

Female. Measurements. n=50. Length from apex of crown to apex of tegmina 5.60–6.23 mm. Length from apex of crown to apex of abdomen 4.48–4.94 mm. Crown median length 0.41–0.47 mm. Crown length next to eye 0.33–0.36 mm. Pronotum length 0.62–0.68 mm. Head width across eyes 1.45–1.58 mm. Pronotum

width 1.35–1.49 mm. Ocellus diameter 53.4–62.8 μm; interocular distance 89.0–109.3 μm. Crown angle 115.5–123.2°.

Genital capsule. Sternite 7. V-shaped notch, relative depth of notch 0.49–0.60 times greatest length of sternite 7; ratio of length to width 0.65–0.81. Posterolateral margins truncate in Oorlogskloof and Garies (Fig. 6N) specimens, narrowly rounded in Citrusdal, Clanwilliam, Garies (Fig. 6L) and Piketberg (Fig. 6M).

Valvifer 1. Variable in roundness of margins, dorsal and ventral margins broadly rounded, anterior and posterior margins narrowly rounded (Figs 3D, 4A, B, 6O–R). Ratio of length to width 1.47–1.84.

Valvula 1. Sculpture strigate (Fig. 3A–C), angulate at apex and subapex (Fig. 3A) and parallel to dorsal margin from subapex to base (Fig. 3B, C).

Valvifer 2. Similar to valvifer 2 in Figs 4J, attached to valvula 2, detail as in Figs 4E, 5E.

Valvula 2. Whole part as in Fig. 4E, serration in Fig. 3E, H, short tooth in Fig. 3G.

Valvula 3. Shape as in Fig. 4K. Macrosetae 37.4–79.2 μm (Figs 3F, 4C).

Etymology. Named for the sharp bend in the aedeagal shaft, in Latin. Bend, *flexus*, and aedeagus, *verpa*. Gender masculine.

Distribution. Brakwater, Ceres, Citrusdal, Clanwilliam, Darling, Klipheuwel, Garies, Gouda, Hermon, Piketberg, Wiedouw, Fig. 18A, red squares.

Discussion. The aedeagus of this species is strongly curved, with a right-angled anteriad apical process, that is variable in length, and broken in a number of examined specimens, specifically from Ceres and Darling. The length in most specimens depicted in Fig. 6A, with the longest found in one specimen from Garies, Fig. 6B. In this male from Garies the subgenital plate, pygofer process (Fig. 7J, K), connective and style resemble those of the other specimens in this species. The pygofer process is apical, variable in shape and orientation, and damaged in some specimens. Plant distribution records for *Salvia lanceolata* in Fig. 18C.

***Retevolatus semicurviverpus* sp. nov.**

http://zoobank.org/E81353AE-6A7E-4226-8008-81BD9A46517A

Figures 4D–K, 8A–L

Material examined. Type locality: Republic of South Africa, Northern Cape Province, South of Springbok, Biesiesfontein farm; -29.75, 17.933; 29 Sep.–3 Oct. 2002; M. Stiller leg.; sweep *Searsia undulata*, Anacardiaceae.

Type specimen. Holotype male, pinned, with genitalia in a separate microvial. Original label: "R.S.A., Biesiesfontein farm, Springbok, -29.75, 17.933; 29.ix.–3.x.2002, M. Stiller" "sweep *Rhus* [now *Searsia*] *undulata*, Anacardiaceae" "SANC Pretoria Dbase CCDL18346 (blue paper)".

Paratypes. 12♂♂, 10♀♀

South Africa • 11♂♂, 10♀♀; ibid. holotype. SANC, BMNH, INHS.

South Africa • 1♂; ibid. holotype; 29 Sep. 2002; M. Stiller leg.; light trap; SANC Pretoria Dbase CCDL18346.

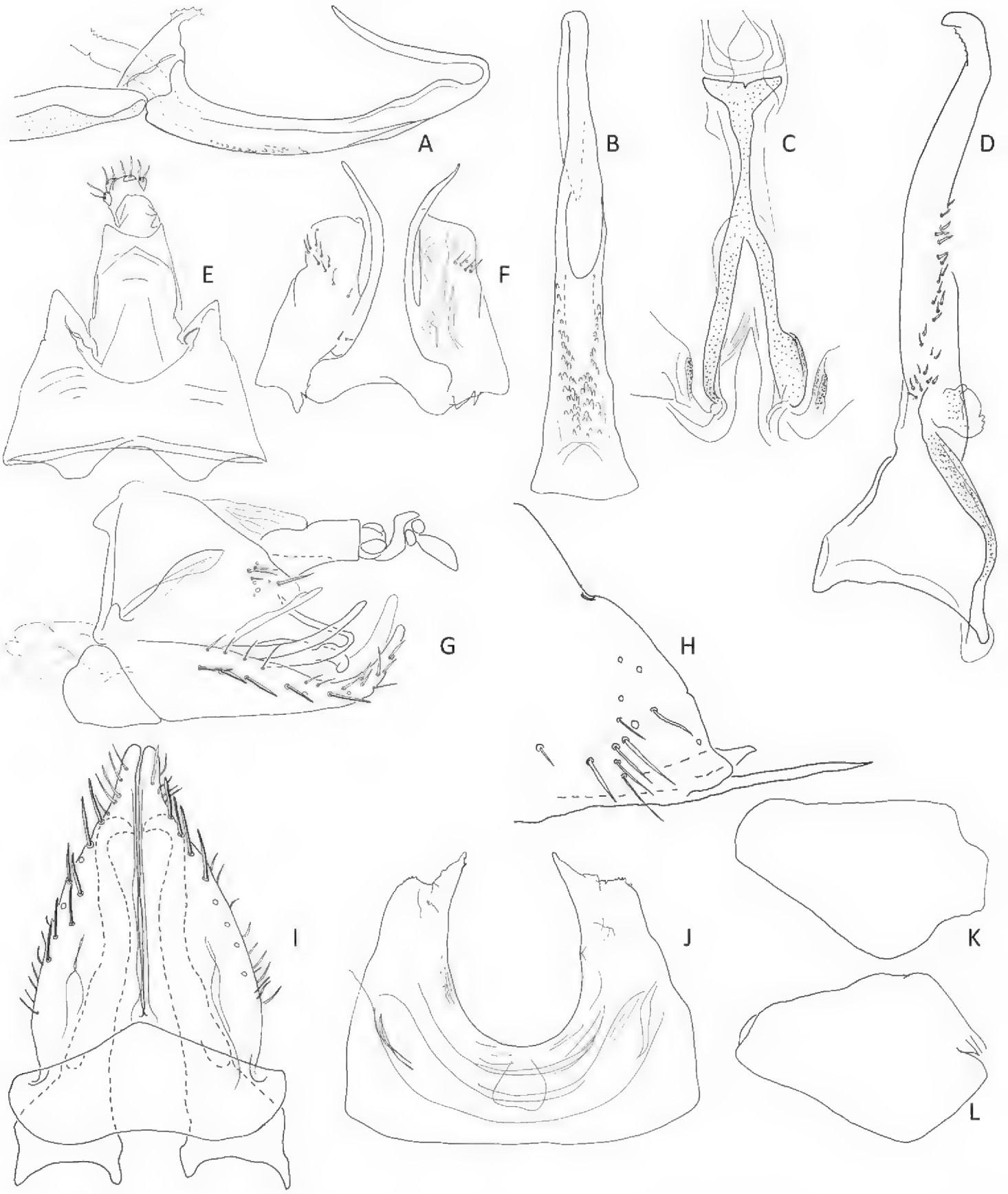

Figure 8. *Retevolatus semicurviverpus* gen. nov. & sp. nov. male genitalia and female ovipositor **A** aedeagus, lateral **B** aedeagus, ventral **C** connective **D** style **E** pygofer, dorsal **F** pygofer, ventral **G** pygofer, lateral **H** pygofer lobe, lateral **I** subgenital plate **J** sternite 7 **K** valvifer 1, left **L** valvifer 1, right.

Diagnosis. Male aedeagus with shaft widely curvate, C-shaped, at apex with single, acutely-angled anteriad, sclerotized process; gonopore ventromediad; shaft ventrobasally to ventromedially coarsely denticulate (Fig. 8A, B). Style apophysis with apex narrowly curvate mediad (Fig. 8D). Connective elongate (Fig. 8C), ratio length to width 3.2–3.5, stem length to arm length 2.2–2.6. Pygofer process ventral, tubular,

concavely curvate in lateral view, lateroposteriad in ventral view (Fig. 8F, G). Female sternite 7 with deep, semi-circular notch (Fig. 8J).

Male. Measurements. n=22. Length from apex of crown to apex of tegmina 5.69–5.98 mm. Length from apex of crown to apex of abdomen 4.24–4.64 mm. Crown median length 0.42–0.45 mm. Crown length next to eye 0.31–0.34 mm. Pronotum length 0.59–0.63 mm. Head width across eyes 1.45–1.51 mm. Pronotum width 1.35–1.41 mm. Ocellus diameter 47.0–58.7 μm; interocular distance 99.2–118.4μm. Crown angle 116.5–121.3°.

Genitalia. Pygofer lobe. Macrosetae absent, fine setae sparsely on lobe (Fig. 8H). Process origin ventrally on pygofer, concavely curvate, acuminate, tubular, moderately sclerotized (Fig. 8F). Pygofer lobe desclerotized, triangular; ventromedially with membranous lobe, variable in orientation and projection beyond pygofer lobe (Fig. 8H).

Subgenital plate. Length to width 2.2–2.4 times longer than width at confluence of subgenital plate and valve. Macrosetae 5–10, variable between left and right plate (Fig. 8I). Apex of style near apex of subgenital plate (Fig. 8I).

Aedeagus. Dorsal apodeme narrow, desclerotized; preatrium reduced (Fig. 8A); apex of shaft reflexed anteriad, long, about 0.4–0.5 times as long as vector length of shaft from apex of apogee to base of shaft (Fig. 8A, B). Shaft widely curvate, angle subtended by arc 53.4–68.1°, coarse denticulation ventrally, in basal half.

Connective. Elongate, ratio of length to width 3.2–3.5; stem length to arm length 2.2–2.6 (Fig. 8C).

Style. Apophysis apex curved mediad; length of apophysis 0.4 times greatest length through sagittal plane (Fig. 8D).

Female. Measurements. n=15. Length from apex of crown to apex of tegmina 5.91–6.12 mm. Length from apex of crown to apex of abdomen 4.37–4.87 mm. Crown median length 0.44–0.47 mm. Crown length next to eye 0.33–0.35 mm. Pronotum length 0.61–0.64 mm. Head width across eyes 1.51–1.57 mm. Pronotum width 1.41–1.47 mm. Ocellus diameter 53.6–61.2 μm; interocular distance 100.3–113.1 μm. Crown angle by trigonometry 116.9–120.1°.

Genital capsule. Sternite 7. Semi-circular notch, posterior margins straight or slightly concave, fine irregular, asymmetrical denticles marginally (Fig. 8J). Relative depth of notch 0.65–0.68 times greatest length of sternite 7; ratio of length to width 0.74–0.83.

Valvifer 1. Dorsal margin sublinear, ventrobasal margin sublinear, ventrodistal margin rounded, posterior margin obtuse (Fig. 8L) or truncated (Figs 4F, 8K). Ratio of length to width 1.51–1.87.

Valvula 1. Shape in Fig. 4D.

Valvifer 2. Shape in Fig. 4J.

Valvifer 2. Shape in Fig. 4E.

Valvula 3. Shape as in Fig. 4K. Macrosetae variable in number (Fig. 4I), length 35.8–55.2 μm.

Etymology. Named for the weak curve in the aedeagal shaft, in Latin. Half, *semi*, curved, *curvus*, and aedeagus, *verpa*. Gender masculine.

Distribution. Biesiesfontein, Fig. 18A, green circle.

Discussion. The aedeagus of this species is weakly curved, with an acutely angled dorsoanteriad, apical process that is constant in length, and whole in all examined specimens. The pygofer process is uniform in examined specimens, originating ventrally on the pygofer, acuminate and directed dorsoposteriad. The apophysis of the style of this species is curved mediad at its apex, and straight in *R. subspiniverpus* and *R. flexiverpus*. The deep, rounded notch of the sternite 7 of this species is distinct from the shallow or deep V-shaped notch of the other two species. The color and shape in dorsal and lateral views of this species resembles that of *R. flexiverpus* in Fig. 1A–I closely.

***Retevolatus subspiniverpus* sp. nov.**

http://zoobank.org/7EE5B450-6062-47C8-B763-CFDA3ED93951

Figures 2A–C, 5A–G, 9A–L

Material examined. Type locality: Republic of South Africa, Western Cape Province, Nuwerus; -31.14, 18.35, 10 Nov.1971, J.G. Theron leg.

Type specimen. Holotype male, pinned, with genitalia in a separate microvial. Original label: "South Africa, Nuwerus, 10-11-71, J.G. Theron" "SANC Pretoria Dbase CCDL27852" (blue paper).

Paratypes. 29♂♂, 16♀♀

South Africa • 29♂♂, 16♀♀; ibid holotype. SANC, BMNH, INHS.

Diagnosis. Male aedeagus with shaft strongly curvate, C-shaped, subapex dorsally with single, straight, narrow, right-angled anterodorsad, sclerotized process; gonopore apical, incised between lateral margins; shaft with lateral margins coarsely denticulate (Fig. 9A, B). Style apophysis straight (Fig. 9E). Connective elongate (Fig. 9C), ratio of length to width 3.4–3.7; stem length to arm length 2.1–2.3. Pygofer process present basally on pygofer lobe, sublinear, acuminate, tubular, moderately sclerotized, orientation dorsoposteriad (Fig. 9F, G, I). Female sternite 7 with wide, shallow V-shaped notch, sternite distally narrower than base (Fig. 9J).

Male. Measurements. n=28. Length from apex of crown to apex of tegmina 4.51–4.75 mm. Length from apex of crown to apex of abdomen 3.29–3.61 mm. Crown median length 0.34–0.36 mm. Crown length next to eye 0.28–0.30 mm. Pronotum length 0.52–0.55 mm. Head width across eyes 1.24–1.30 mm. Pronotum width 1.16–1.22 mm. Ocellus diameter 39.3–50.7 μm; interocular distance 75.0–89.0 μm. Crown angle 120.6–124.1°.

Genitalia. Pygofer lobe. Macrosetae absent, fine setae sparsely on lobe (Fig. 9G, I). Process origin is subapically on ventral margin of pygofer lobe, sublinear, acuminate, tubular, moderately sclerotized, orientation dorsoposteriad. Pygofer lobe desclerotized, acutely angled triangle, desclerotized lobe obscure, mediad of lobe (Fig. 9I).

Subgenital plate. Length to width 2.0–2.2 times longer than width at confluence of subgenital plate and valve. Macrosetae 9–15, variable between left and right plate. Apex of style extended half way into subgenital plate (Fig. 9H).

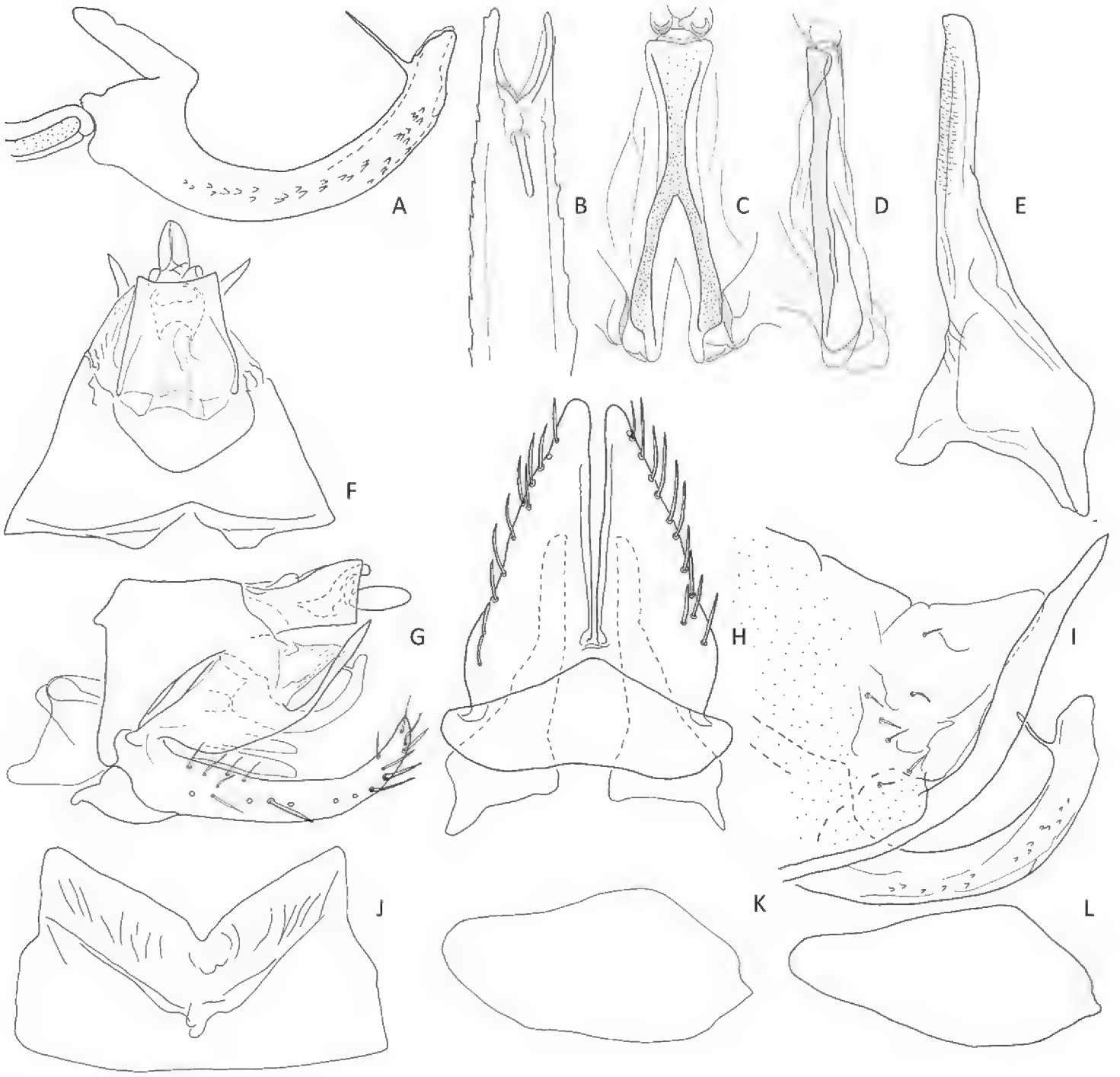

Figure 9. *Retevolatus subspiniverpus* gen. nov. & sp. nov. male genitalia and female ovipositor **A** aedeagus, lateral **B** aedeagus, apex, anterior **C** connective, dorsal **D** connective, lateral **E** style **F** pygofer, dorsal **G** pygofer, lateral **H** subgenital plate **I** pygofer lobe, lateral **J** sternite 7 **K** valvifer 1, left **L** valvifer 1, right.

Aedeagus. Dorsal apodeme digitate, reflexed anteriad; preatrium absent; subapex dorsally with straight, right-angled, elongate, anterodorsad process (process sometimes broken, see Discussion below) (Fig. 9A, B). Shaft narrowly curvate, angle subtended by arc 87.1–134.3°, incised apically along dorsal and ventral margins bordering gonopore; laterally with coarse denticulation.

Connective. Elongate, ratio length to width 3.4–3.7; stem length to arm length 2.1–2.3 (Fig. 9C).

Style. Apophysis straight (Fig. 9E), length of apophysis 0.3–0.4 times greatest length through sagittal plane.

Female. Measurements. n=15. Length from apex of crown to apex of tegmina 4.97–5.23 mm. Length from apex of crown to apex of abdomen 3.96–4.14 mm.

Crown median length 0.38–0.41 mm. Crown length next to eye 0.31–0.33 mm. Pronotum length 0.57–0.59 mm. Head width across eyes 1.36–1.42 mm. Pronotum width 1.26–1.33 mm. Ocellus diameter 43.2–56.6 μm; interocular distance 89.3–103.9 μm. Crown angle 118.7–122.5°.

Genital capsule. Sternite 7. V-shaped notch (Fig. 9J), relative depth of notch 0.38–0.45 times greatest length of sternite 7; ratio of length to width 0.56–0.65.

Valvifer 1. Dorsal margin widely curvate, ventral margin more strongly curvate; anterior margin rounded, posterior margin acute (Figs 5B, 9K, L). Ratio of length to width 1.85–2.04.

Valvula 1. Shape in Fig. 5A. Detail of sculpture, striate, at subapex (Fig. 5C), midsection (Fig. 5D).

Valvifer 2. Similar to valvifer 2 in Figs 4J.

Valvula 2. Shape in Fig. 5E. Detail of serration and sculpture at subapex in Fig. 5G.

Valvula 3. Macrosetae 4–5 in number (Fig. 5F), 36.8–66.1 μm.

Etymology. Named for the subapical position of the spine on the aedeagal shaft, in Latin. Under, *subter*, spine, *spinus*, aedeagus, *verpa*. Gender masculine.

Distribution. Nuwerus, Fig. 18A, blue triangle.

Discussion. The aedeagus of this species is strongly curved, with a subapical, right-angled dorsoanteriad process. Both or part of the apex and process of the shaft were damaged randomly in seven of 11 dissected of specimens, i.e. the process was broken at the base in four and broken at the apex in one specimen, and the shaft apex was partially or entirely damaged in two specimens. The pygofer process origin is ventrally and basally on the pygofer lobe, orientation posteriad, tubular and apex acuminate. The sternite 7 of this species (Fig. 9J) has a similar V-shaped, shallow notch to that of *R. flexiverpus* (Fig. 6L), but is narrowed distally, even more than in Fig. 6M. The valvifer 1 is more elongated than in the other species of *Retevolatus*.

Flavorubivolatus gen. nov.

http://zoobank.org/266CA90E-1824-418C-9505-042F9A8559B2

Figures 10–17

Type-species. *Flavorubivolatus glabriverpus* sp. nov., by present designation.

Diagnosis. Macropterous, with tegmina longer than abdomen, hind wing with well-developed jugal lobe (Fig. 15P), 2.6–3.8 mm from apex of crown to apex of tegmina. Color yellow to stramineous (Fig. 10A, E) or reddish orange (Figs 10F–I, 11A–D) head, pronotum and scutellum, tegmina light brown, translucent, costal cells opaque, pale yellow (Fig. 10E, F) or whitish (Fig. 11D). Aedeagus with shaft narrow tubular (Fig. 15A, C) or compressed (Figs 16A–D, 17B–D), either immaculate, curvate, convex, orientation posteroventrad (Fig. 15E), or with shaft with paired long (Fig. 16A–D) or short basal acuminate process (Fig. 17C, D). Subgenital plate triangular, apex narrowly rounded (Fig. 15O), broadly round (Fig. 16J) or truncated

Figure 10. *Flavorubivolatus* gen. nov. Dorsal and lateral habitus view, males, females and nymphs. **A–E** *F. glabriverpus* sp. nov. Dorsal and lateral habitus view, males, females and nymphs **A** Piketberg, male, dorsal **B** Clanwilliam, female, dorsal **C** Driehoek, female, dorsal **D** Sederberge, female, dorsal **E** Driehoek, female, lateral **E–I** *F. tensiverpus* sp. nov. dorsal and lateral habitus view, males, females **F** Cedarberg, female, dorsal **G** Clanwilliam, male, dorsal **H** Clanwilliam, female, lateral **I** Doltuin, female, lateral. Scale bars: 1 mm (**A–D**, **F–I**).

Figure 11. *Flavorubivolatus* gen. nov. and *Renosteria* species habitus **A–D** *F. curtiverpus* sp. nov. Dorsal habitus view, males. **A** Clanwilliam, female, dorsal **B** Clanwilliam, female, dorsal **C** Dwarsrivier, male, dorsal **D** Dwarsrivier, male, dorsal **E–I** *Renosteria* species: **E** *R. overbergia*, male **F** *R. hoekoensis*, male **G** *R. hantamensis*, male, Kamieskroon **H** *R. hantamensis*, female, Nieuwoudtville **I** *R. goudinica*, male. Scale bars: 1 mm (**A–I**).

(Fig. 17H); apex extended beyond margin of pygofer lobe (Figs 15K, 16L, 17G). Pygofer lobe at apex with short (Fig. 15N) or long acuminate sublinear process, oriented posteromediad (Fig. 16H, I, K, N) or apically denticulate and oriented mediad (Fig. 17G, J, K, L).

Male and female. Color. Yellow to stramineous (Fig. 10A, E) or reddish orange head, pronotum and scutellum (Figs 10F–I, 11A–D), tegmina light brown, translucent, costal cells opaque, pale yellow (Fig. 10A, E) or whitish (Fig. 10F, H).

Measurements. All specimens of all species. Length from apex of crown to apex of tegmina 2.58–3.78 mm. Crown median length 0.44–0.54 mm. Crown length next to eye 0.31–0.36 mm. Pronotum length 0.35–0.39 mm. Head width across eyes 0.89–1.12 mm. Pronotum width 0.88–0.97 mm. Ocellus diameter 25.9–35.3 μm; interocular distance 40.3–54.1 μm. Males and females with similar dimensions. Crown angle by trigonometry 85.1–92.8°.

Wings. Tegmina with four apical cells, outer and central anteapical cells (inner anteapical cell and inner discal cells merged) (Fig. 15Q). Hind wing with vannal lobe large, greatest length 0.4 times greatest width of hind wing), four apical cells (Fig. 15P).

Profemur. Anteromedial margin with basal 7–9 AV setae short, spine-like; intercalary setae (n=8–10) disjunct without AV_1 differentiation, subapical AM_1 longer and thicker than any setae in IC.

Metatibia. Hind knee setal formula 2+2+1; apical pair sub equal, shorter than long median seta, median setae with one very long and the other very narrow and about half as long; basal seta longer than median and apical setae.

Metatarsi. Metatarsus 1 apex with five rounded platellae or four rounded and one acute platellum; metatarsus 2 apex with two lateral acute and two medial rounded platellae.

Abdominal apodemes. Anterior abdominal apodeme with desclerotized, rounded or angulate lobes, expanded anteriad and posteriad, not wider than width of apodeme, lobes contiguous in males, separate in females.

Male. Genitalia. **Anal tube.** Rectangular (Fig. 15J) or conical (Figs 16H, 17J), 1.1–1.4 times longer than wide.

Pygofer. In lateral view about as long as wide (Figs 15J, K, 16H, L), or longer than wide (Fig. 17G, J), anal tube incised either superficial (Fig. 15J, K), or about half way (Fig. 16H, L), or about three quarters into pygofer (Fig. 17G, J), anterior basal fold straight to sublinear at about 45°; anterior apodemes narrow.

Pygofer lobe. Pygofer lobe contiguous with pygofer, apex broadly rounded, with desclerotized rounded lobe (Fig. 15J, K, L, N) or more narrowly rounded with wider membranous lobe (Figs 16I, 17G) at apex. Pygofer process either short, acute, curvate (Fig. 15L, N), or sinuous (Fig. 16K, N) or elongate and straight with denticulate apex (Fig. 17J, K, L). Macrosetae elongate, narrow, near dorsoposterior apex of pygofer, 10–20, longest macrosetum about as long as width across subapex (Fig. 15K) or midsection pygofer lobe (Figs 16L, 17G).

Subgenital plate. Lateral margin sinuous, medial margin straight; either acutely triangular, apex narrowly rounded (Fig. 15O), or right-angled elongate triangular with broadly rounded apex (Fig. 16J), or right-angled triangular with truncated apex (Fig. 17H); 1.6–2.2 times longer than width at confluence of valve and subgenital plates. Macrosetae 1–3 irregular rows, marginal to submarginal, across most of lateral margin, 7–15 macrosetae, variable in number between left and right subgenital plate. Apex extended beyond posterior margin of pygofer, orientation medioposteriad (Figs 15K, 16L) or curvate dorsoposteriad (Fig. 17G).

Valve. Broader than long, obtusely triangular (Figs 15O, 16J, 17H).

Aedeagus. Shaft longer than dorsal apodeme and preatrium (when present), either tubular, concavely curvate, glabrous (Fig. 15A, C, E); or compressed and straight to sublinear in (Fig. 16A–D), with long, basal to subbasal paired, straight process, process about half as long as shaft; or compressed and straight (Fig. 17B–D) with very short paired, acuminate process basally, length of process less than diameter of shaft. Dorsal apodeme and preatrium short, shorter than shaft (about 1/5 length of shaft). Gonopore incised longitudinally into apex, symmetrical (Fig. 15B, D, F); or oblique from subapex dorsally to less than half of ventral margin (Fig. 16A–D); or approximately half of ventral margin (Fig. 17B, C, D)

Style. Relatively short (ratio of length to width, 1.9–2.4); anterior lateral arm either wide and apex rounded, in line with mid-section, or acuminate and obtusely angled to mid-section; anterior medial arm short; apophysis half as wide as width across preapical lobe; apophysis either scalpriform in lateral view (Fig. 15I), or digitate, curved lateroposteriad (Fig. 16E) or acuminate, angled lateroposteriad (Fig. 17F), apophysis 0.3–0.4 times as long as greatest length of style; situated basally in subgenital plate (Figs 15O, 16J, 17H).

Connective. Stem and arms short, of similar proportions, greatest length 0.9–1.1 times greatest width; stem 0.5–0.7 times as wide as width across arms; arms widely separated, parallel to subparallel, U-shaped with stem; stem 0.8–1.1 times longer than length of arms (Figs 15G, 16F, G, 17E).

Female. Genital capsule. **Sternite 7.** Slightly shorter (median length) than greatest width (0.7–0.8 times longer than wide), with lateral margin convergent, posterior margin variable, with very shallow V-shaped notch or without notch (Figs 15M, 16M).

Valvifer 1. Slightly longer than wide, dorsal and ventral margins broadly rounded, anterior margin truncated and posterior margin acute (Fig. 12A, J), or rectangular (Fig. 13C, F) or elongated and pointed anterior and posterior margins (Fig. 14A, C, E). In dorsal view valvifers fused membranously at apex, dorsal margin right-angled mediad.

Valvula 1. Lanceolate, curvate (Figs 12A, 13H). Sculpture submarginal along dorsal margin, attaining about half-length, reticulate, maculose (Fig. 13I, J, K) (as categorized by Zahniser and Dietrich 2008).

Valvifer 2. Elongate, with group of sensory setae, margin attached to valvula 3 rounded or rectangular (Figs 12C, I, 13D, G, 14D)

Valvula 2. About apical half serrate (Figs 12B, G, 13D, L, 14D), with trough and crest with fine teeth (Figs 12D, E, H, K, 14B); midsection with sclerotized dorsal margin.

Valvula 3. Single row of submarginal macrosetae (Figs 12C, F, 13A, B, E, 14F).

Etymology. Named the yellow-red hopper, in Latin, yellow, *flavus*, red, *ruber*, nouns in apposition and flying, *volatus*. Gender Masculine.

Discussion. The three species in this genus are recognized by their color and configuration of the aedeagus. *Flavorubivolatus glabriverpus* sp. nov. is yellowish (Fig. 10A, E) with a concavely curved aedeagal shaft without spines (Fig. 15A, C, E), and *F. tensiverpus* sp. nov. and *F. curtiverpus* sp. nov. are more reddish (Figs 10F–I, 11A–D, respectively) with the former with a straight shaft and spines about half

as long as the shaft (Fig. 16A–D) and *F. curtiverpus* sp. nov. with the spines short, shorter than the diameter of the shaft (Fig. 17C, D). Low numbers of specimens of *F. tensiverpus* sp. nov. as well as lack of females of *F. curtiverpus* sp. nov. and their overlapping localities and collection dates with specimens of *F. glabriverpus* sp. nov. has detracted from the robust species hypothesis. However, no parasites or parasitoids were found in any of the examined specimens, although the sex-altering effect of *Wolbachia* (Negri et al. 2009; Saridaki and Bourtzis 2010) was considered, but the males of these species do not appear to be feminized. No parts were considered deformed or intermediate, or teneral. None of the specimens of the *Flavorubivolatus* gen. nov. collected by the author were on *Dicerothamnus rhinocerotis*, the only known associated plant of *Renosteria*.

This new genus resembles *Renosteria* in macroptery, similar triangular crown (i.e., species of *Renosteria* 71.9–78.7°, species of *Flavorubivolatus* gen. nov. 85.1–92.8°), and the corresponding longitudinal, rectangular sternite 7. It differs from *Renosteria* in color (species of *Renosteria* are yellow-green (Fig. 13G–I) or brown (*R. overbergia* and *R. cangica* similar, as in Fig. 11F), compared to yellow or reddish in *Flavorubivolatus*) and in its slightly larger length from apex of vertex to apex of tegmina, i.e. 3.5–4.2 mm in *Renosteria*, compared to 2.6–3.8 mm in *Flavorubivolatus*. It also differs in the following aspects of the male genitalia.

The male pygofer lobe in *Renosteria* is obtusely or acutely triangular or rounded, with the process origin dorsomedial or subapical or apical, straight or sublinear, orientation ventrad or posteroventrad. In contrast the pygofer lobe in *Flavorubivolatus* gen. nov. is broadly rounded, with the process origin apical, curvate or straight, orientation ventrad or mediad.

The aedeagus in *Renosteria* is convexly curvate (*R. cangica*, *R. goudinica*, *R. overbergia*, *R. spadix*, *R. waverena*), concavely curvate (*R. montagua*, *R. piquetia*), or sinuous (*R. albanensis*, *R. hantamensis*, *R. hoekoensis*, *R. karosella*) or straight (*R. ceresensis*); aedeagal process about as long as shaft, or half as long as shaft (*R. goudinica*), origin usually on atrium or preatrium, rarely on the shaft (*R. overbergia*, *R. piquetia*). The aedeagus in *Flavorubivolatus* is convexly curvate without process (*F. glabriverpus* sp. nov.) or straight to sublinear with straight process half as long as shaft (*F. tensiverpus* sp. nov.) or very short (*F. curtiverpus* sp. nov.) with origin subbasally on shaft.

The connective in *Renosteria* with ratio of greatest length to greatest width 1.09–1.31. In *Flavorubivolatus* gen. nov. the ratio of greatest length to greatest width similar, 0.95–1.22 in *F. glabriverpus* sp. nov., or slightly shorter, 0.82–1.00 in *F. tensiverpus* sp. nov., 0.93–1.04 in *F. curtiverpus* sp. nov. Other ratios such as width stem/width arm, length stem/length arm and length stem/width arm correspond.

The subgenital plate in *Renosteria* requires re-examination, but corresponds in arrangement of macrosetae, with length to width ratio 1.5–1.9 times longer than wide. In *Flavorubivolatus* gen. nov. it is 1.6–1.9 times longer than wide.

The style in *Renosteria* requires re-examination, with the anterior lateral lobe acutely angled to the sagittal plane through the apophysis and mid-section, and in *Flavorubivolatus* gen. nov. it is approximately in line with the sagittal line.

Key to *Flavorubivolatus* gen. nov. males.

1 Male with aedeagus curved concavely (Fig. 15E), shaft edentate; pygofer lobe process short, 3× longer than wide, curved posteroventrad (Fig. 15K, L, N); subgenital plate apex narrowly rounded (Fig. 15O) ..... ***F. glabriverpus* sp. nov.**

1' Male with aedeagus straight with long or short basal or subbasal paired acuminate process; pygofer lobe with short medioposteriad process or long mediad process; subgenital plate apex broadly rounded or truncated..... **2**

2 Male aedeagus with process about half as long as length of shaft (Fig. 16A–D), origin ventrally subbasally on shaft; pygofer lobe process short, linear to sinuous, orientation medioposteriad (Fig. 16H, I, K, N); subgenital plate apex broadly rounded (Fig. 16J)..... ***F. tensiverpus* sp. nov.**

2' Male aedeagus with short process (length shorter than diameter of shaft), ventrobasally (Fig. 17C, D); pygofer lobe process straight, angled mediad (Fig. 17G, J); subgenital plate apex truncated (Fig. 17H) ..... ***F. curtiverpus* sp. nov.**

***Flavorubivolatus glabriverpus* sp. nov.**

http://zoobank.org/E1FFAE31-717D-4DC9-8D10-1300C1E78429

Figures 10A–E, 12A–K, 13A, B, 15A–Q, 18B

Material examined. Type locality: Republic of South Africa, Western Cape Province, Vanrhynsdorp, Gifberg Pass summit, -31.77, 18.76, 700 m, 9 Oct. 2002, M. Stiller leg., sweeping, *Myrovernix* sp., Asteraceae.

Type specimen. Holotype male, pinned, with genitalia in a separate microvial. Original label: "R.S.A., Gifberg Pass summit Vanrhynsdorp, -31.75, 18.70, 9.x.2002, 700 m, M. Stiller leg." "sweeping, *Myrovernix* sp., Asteraceae" "SANC Pretoria Dbase CCDL18270 (blue paper)".

Paratypes. 36♂♂, 54♀♀, 13 nymphs

South Africa • 7♂♂, 9♀♀; Western Cape Province, Sederberge; -32.13, 18.98; 12 Dec. 1971; J.G. Theron leg.; sweeping; SANC Pretoria Dbase CCDL27822.

South Africa • 4♂♂, 9♀♀; Western Cape Province, Clanwilliam Cedarberg; -32.13, 18.98; 21 Dec. 1976; J.G. Theron leg.; sweeping; SANC Pretoria Dbase CCDL27804.

South Africa • 1♂; Western Cape Province, Clanwilliam; -32.16, 18.88; 10 Aug. 1978; J.G. Theron leg.; sweeping; SANC Pretoria Dbase CCDL27825.

South Africa • 4♂♂, 1♀; Western Cape Province, Piekenierskloof; -32.62, 18.95; 18 Jan. 1983; J.G. Theron leg.; sweeping; SANC Pretoria Dbase CCDL27826.

South Africa • 2♂♂, 1♀; Western Cape Province Citrusdal, Middelberg Pass; -32.63, 19.15; 1 Mar. 1985; J.G. Theron leg.; sweeping, *Elytropappus scaber*, Asteraceae; SANC Pretoria Dbase CCDL27828.

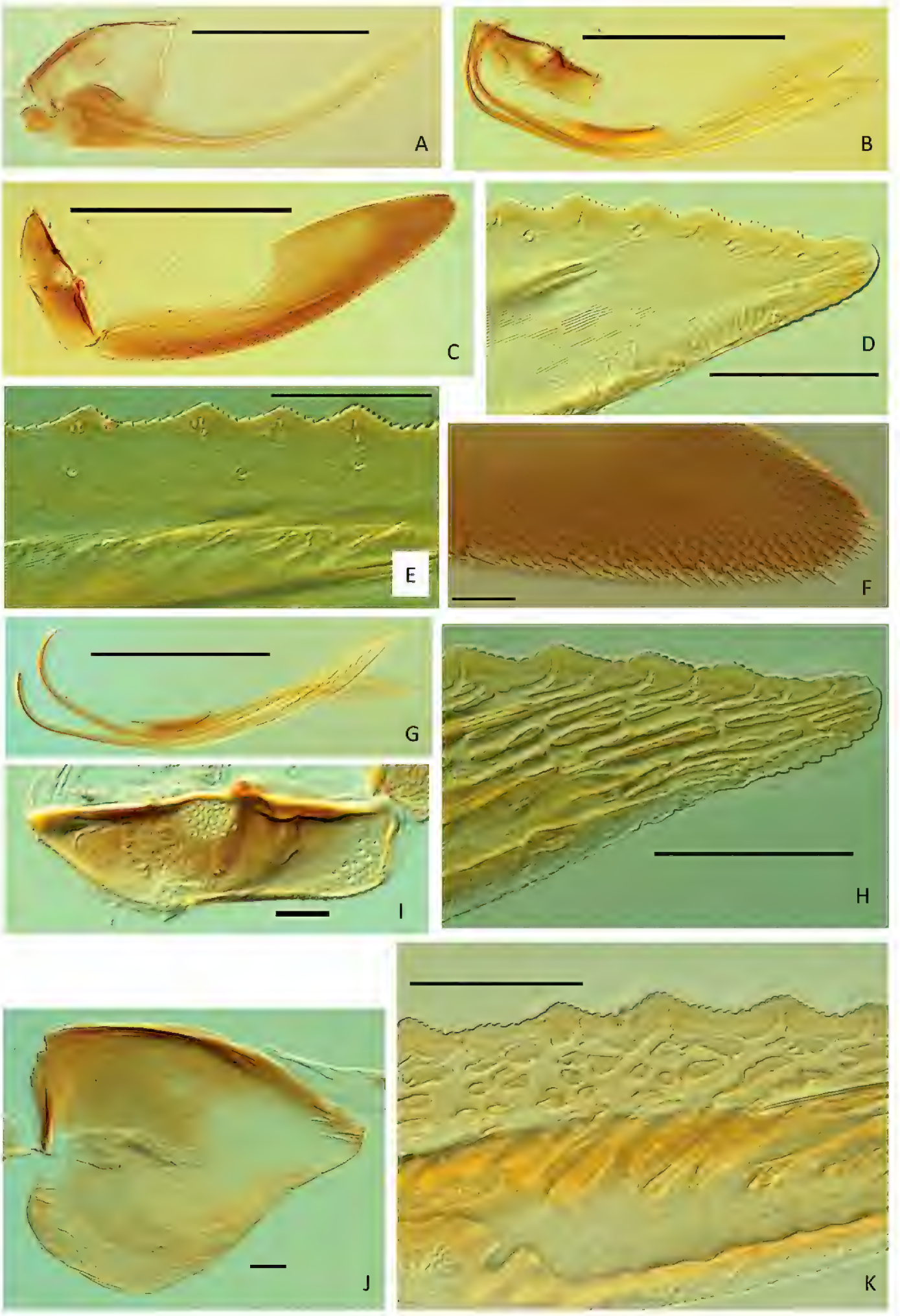

Figure 12. *Flavorubivolatus glabriverpus* gen. nov. & sp. nov. ovipositor **A** valvula 1 and valvifer 1, Dwarsrivier **B** valvula 2 and valvifer 2, Dwarsrivier **C** valvula 3 and valvifer 2, Dwarsrivier **D** valvula 2, apex, Dwarsrivier **E** valvula 2, midsection, Dwarsrivier **F** valvula 3, apex, Dwarsrivier **G** valvula 2, Clanwilliam **H** valvula 2, Sederberge **I** valvifer 2, Dwarsrivier **J** valvifer 1, Clanwilliam **K** valvula 2, midsection, Sederberge. Scale bars: 0.5 mm (**A–C**, **H**); 0.05 mm (**D–G**, **I–K**).

South Africa • 2♂♂, 3♀♀; Western Cape Province, Bokfontein; -33.03, 19.31; 8 Mar. 1985; J.G. Theron leg.; sweeping, *Metalasia muricata*, Asteraceae; SANC Pretoria Dbase CCDL27827.

South Africa • 1♀; Western Cape Province, Algeria Forest Station; -32.373, 19.057; 9 Mar. 1985; J.G. Theron leg.; sweeping; SANC Pretoria Dbase CCDL27830.

South Africa • 2♂♂; Western Cape Province, Cedarberg, Eikeboom; -32.45, 19.16; 9 Mar. 1985; J.G. Theron leg.; sweeping, *Elytropappus scaber*, Asteraceae; SANC Pretoria Dbase CCDL27823.

South Africa • 11♂♂, 19♀♀; ibid. holotype. SANC, BMNH, INHS.

South Africa • 2♂♂, 7♀♀, 3 nymphs; Western Cape Province, Cedarberg, SE Citrusdal, Dwarsrivier Farm; -32.45, 19.2; 10–15 Oct. 2002; M. Stiller leg.; sweeping, *Myrovernix intricata*, Asteraceae; SANC Pretoria Dbase CCDL18271.

South Africa • 6♂♂, 14♀♀, 10 nymphs; Western Cape Province, Cedarberg, SE Citrusdal, Driehoek Farm; -32.433, 19.216; 13 Oct. 2002; M. Stiller leg.; sweeping, *Myrovernix* spp and *Seriphium saxatilis*, Asteraceae, plants mostly sterile, intertwined; SANC Pretoria Dbase CCDL18273.

Diagnosis. Male with aedeagal shaft curvate convexly, immaculate (Fig. 15A–F). Subgenital plate with apex narrowly rounded (Fig. 15O). Anal tube shallowly incised into pygofer (Fig. 15J, K). Pygofer lobe process short, curvate, orientation posteroventrad (Fig. 15K, L, N). Female with sternite longitudinally rectangular (Fig. 15M).

Male. Measurements. n=41. Length from apex of crown to apex of tegmina 2.87–3.03 mm. Crown median length 0.47–0.52 mm. Crown length next to eye 0.32–0.35 mm. Pronotum length 0.34–0.37 mm. Head width across eyes 0.94–1.02 mm. Pronotum width 0.86–0.94 mm. Ocellus diameter 24.9–34.8 μm; interocular distance 37.3–48.8 μm. Crown angle by trigonometry 87.7–92.0°.

Genitalia. Anal tube. Square dorsally and laterally, attached at apex of pygofer (Fig. 15J, K).

Pygofer. Viewed laterally about as long as wide. Basal fold straight, angled about 45° (Fig. 15K).

Pygofer lobe. Posterior margin approximately rectangular, posteroventral margin with membranous, rounded lobe and sclerotized acuminate, curvate process, process about 3 times longer than wide; process origin posteromedially (Fig. 15K, L, N). Subbasally with membranous disc-shaped lobe, orientation mediad (Fig. 15L, N).

Subgenital plate. Acutely triangular, apex narrowly rounded, lateral margin sinuous, medial margin straight, divergent, at about 30° (Fig. 15O). Ratio of length to width 1.8–2.0 times longer than basal width. Apex orientation posteriad (Fig. 15K).

Valve. Posterior margins slightly concave, medial apex triangular (Fig. 15O).

Aedeagus. Shaft immaculate, narrow, tubular. Shaft in lateral view curvate, concave, apex narrowed, about half as wide as subapex (Fig. 15F). Shaft straight in dorsal or ventral view (Fig. 15A, C). Gonopore subapical, incised dorsoventrally

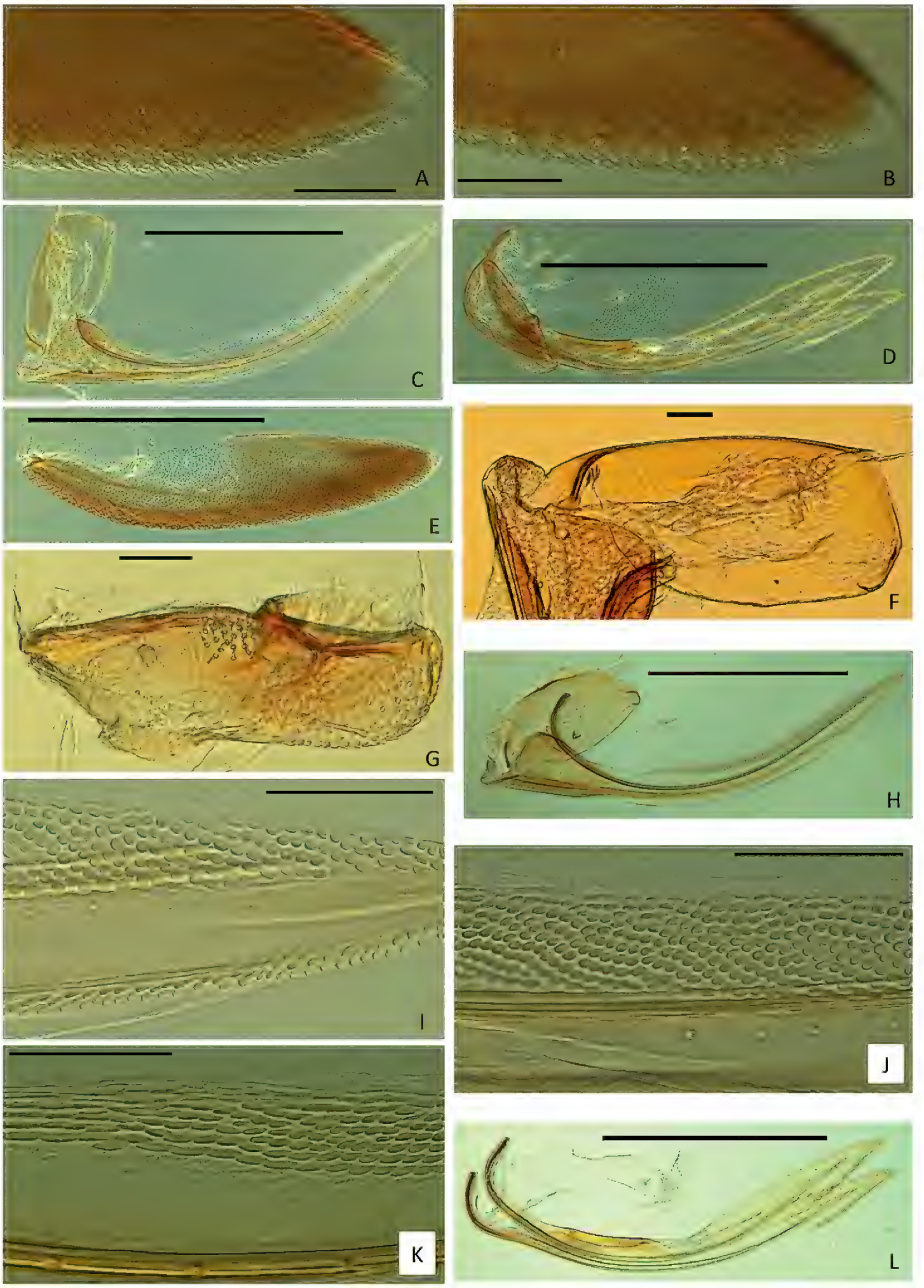

Figure 13. *Flavorubivolatus* gen. nov. ovipositor **A–B** *F. glabriverpus* sp. nov. **A** valvula 3, apex, Sederberge **B** valvula 3, apex, Sederberge **C–L** *F. tensiverpus* sp. nov. **C** valvula 1 and valvifer 1, Clanwilliam **D** valvula 2 and valvifer 2, Clanwilliam **E** valvula 3, Clanwilliam **F** valvifer 1, Clanwilliam **G** valvifer 2, Clanwilliam **H** valvula 1 and valvifer 1, Doltuin **I** valvula 2 apex, Doltuin **J** valvula 2 midsection, Doltuin **K** valvula 2 base, Doltuin **L** valvula 2, Doltuin. Scale bars: 0.05 mm (**A**, **B**, **F**, **G**, **I–K**); 0.5 mm (**C–E**, **H**, **L**).

(Fig. 15B, D, F). Dorsal apodeme elongate, about one quarter as long as shaft, preatrium short (Fig. 15E).

Connective. Ratio greatest length/greatest width=1.01–1.25, length stem/length arm=0.76–1.06, width stem/width arm=0.53–0.69 (Fig. 15G).

Style. Apophysis apex acute in dorsal view (Fig. 15H), in lateral view, rectangular (Fig. 15I). Preapical lobe right-angled; anterior lateral arm with sides parallel, apex rounded; length apophysis 0.3–0.5 times longer than greatest length of style; greatest length/greatest width=1.8–2.2.

Female. Measurements. n=66. Length from apex of crown to apex of tegmina 2.96–3.41 mm. Crown median length 0.48–0.54 mm. Crown length next to eye 0.31–0.37 mm. Pronotum length 0.34–0.38 mm. Head width across eyes 0.97–1.06 mm. Pronotum width 0.88–0.97 mm. Ocellus diameter 25.6–35.7 μm; interocular distance 38.4–49.6 μm. Crown angle by trigonometry 87.3–92.0°.

Genital capsule. Sternite 7. Almost rectangular, base wider than apex, lateral margins convergent (Fig. 15M); 0.7–0.8 times longer than greatest width; distal margin with shallow V-shaped notch, laterally margins broadly rounded.

Valvifer 1. Dorsal and ventral margins rounded, asymmetric. Anterior and posterior margins narrowly rounded (Fig. 12J). Elongated or about as long as wide.

Valvula 1. Sculpture similar to that of *F. tensiverpus*, i.e. maculose. Valvula and valvifer in Fig.12A.

Valvifer 2. As in Fig. 12I as attached to valvula 3 (Fig. 12C).

Valvula 2. Apical half denticulate (Fig. 12B, G), with fine serration in trough between crests (Fig. 12D, E, H, K). Specimens with poorly developed sculpture (Fig. 12D, E) and well developed sculpture (Fig. 12H, K).

Valvula 3. Uniseriate setae apically and subapically, 4–10, average and standard deviation 7.8±1.7 μm, longest 34.5 μm, shortest, 12.3 μm (Figs 12C, F, 13A, B).

Etymology. Latin, adjective and noun in apposition, for hairless, smooth, bald, *glabra*, and the aedeagal shaft which is devoid of any spines or processes. Gender Masculine.

Distribution. Bokfontein, Citrusdal, Clanwilliam, Driehoek farm, Dwarsrivier, Gifberg Pass, Piketberg, Sederberge, Fig. 18B, green squares.

Discussion. *Flavorubivolatus glabriverpus* has the crown and pronotum yellowish, and the tegmina yellowish-red with this color pattern similar in males and females. *Flavorubivolatus tensiverpus* and *F. curtiverpus* are more reddish in color. Variation was found in male genitalia in apex of aedeagus, with the apex of the gonopore parallel or convergent (Fig. 15A, B). Measurement of subgenital plate variable, especially width due to imperfect horizontal orientation. The style was shorter than in other species of this genus. Connective with arms and stem of similar proportions. Dissections included 21 males and 13 females, thus 57% of males and 24% of females. No recently dissected males were parasitized, but one female abdomen contained a stylops and one female with a dryinid pupal case lateroventrally between the head and pronotum. Plant distribution records of some associated plants in Fig. 18E, F (*Seriphium saxatilis*, *Myrovernix intricata* respectively). The color pattern of *Renosteria spadix* corresponded to that of *F. glabriverpus*.

***Flavorubivolatus tensiverpus* sp. nov.**
http://zoobank.org/DAB69824-C705-432C-9379-D91E71A53362
Figures 10F–I, 11A, 13C–L, 16A–N, 18B

Material examined. Type locality: Republic of South Africa, Western Cape Province, Cedarberg near Clanwilliam, -32.35, 18.98, 21 Dec. 1976, J.G. Theron leg.

Type specimen. Holotype male, pinned, with genitalia in a separate microvial. Original label: "South Africa, Sederberge, 21.xii.1976, J.G. Theron" "SANC Pretoria Dbase CCDL27824 (blue paper)".

Paratypes. 8♂♂, 4♀♀, 1 nymph.

South Africa • 5♂♂, 2♀♀; ibid. holotype, SANC, BMNH.

South Africa • 1♂, 1♀; Western Cape Province, Halfmanshof; -33.14, 18.96; 17 Dec. 1981; J.G. Theron leg.; sweeping, *Elytropappus glandulosa*, Asteraceae; SANC Pretoria Dbase CCDL27829.

South Africa • 1♂; Western Cape Province, Cedarberg wilderness, site 1; -32.4000, 19.0378; 14 Dec. 2016; M. Stiller leg.; sweeping, *Phylica plumigera*, Rhamnaceae; SANC Pretoria Dbase CCDL27831.

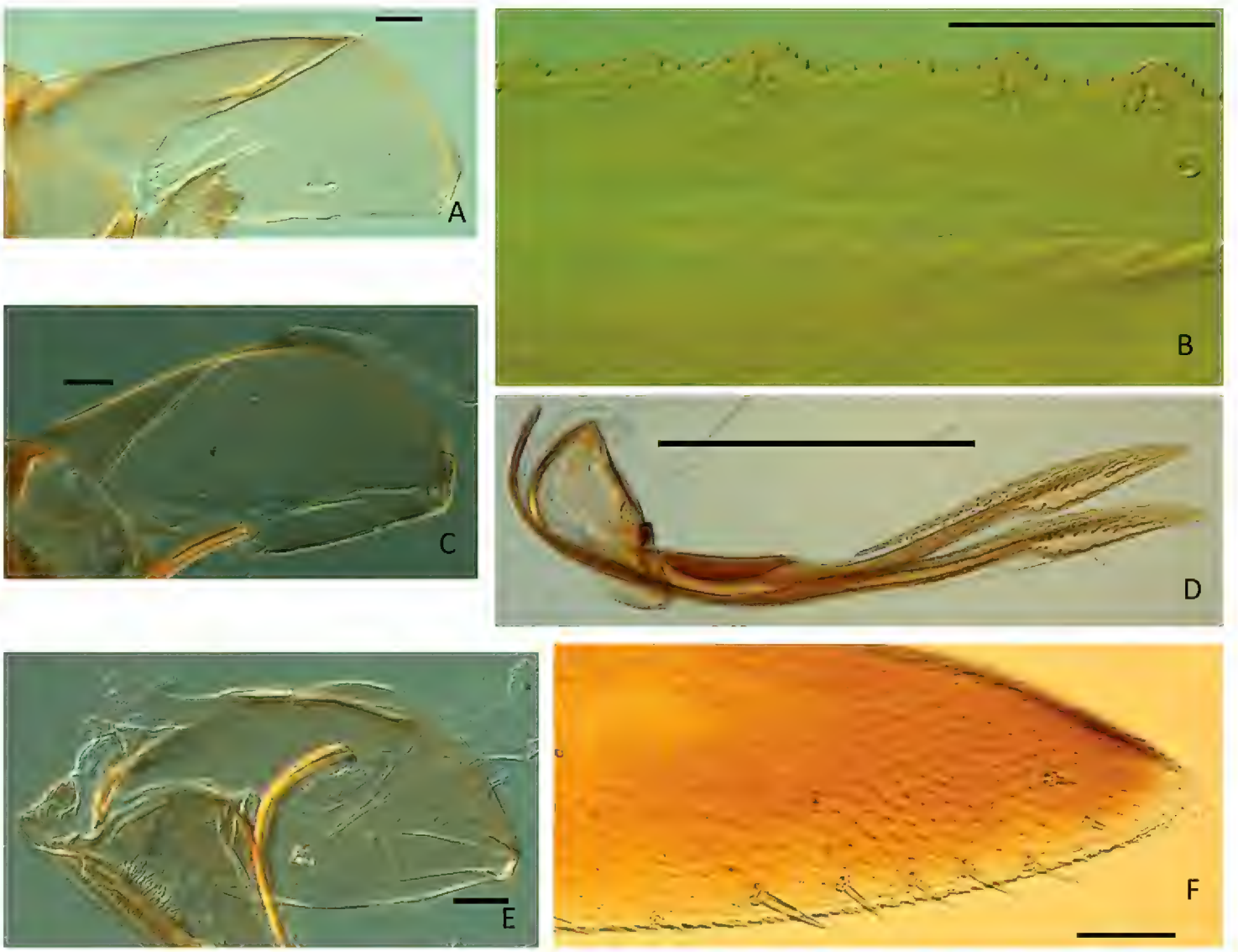

Figure 14. *Flavorubivolatus tensiverpus* gen. nov. & sp. nov. ovipositor **A** valvifer 1, Doltuin **B** valvula 2, midsection, Doltuin **C** valvifer 1, Halfmanshof **D** valvula 2 and valvifer 2, Halfmanshof **E** valvifer 1, Halfmanshof **F** valvula 3, apex, Halfmanshof. Scale bars: 0.05 mm (**A–C**, **E**, **F**); 0.5 mm (**D**).

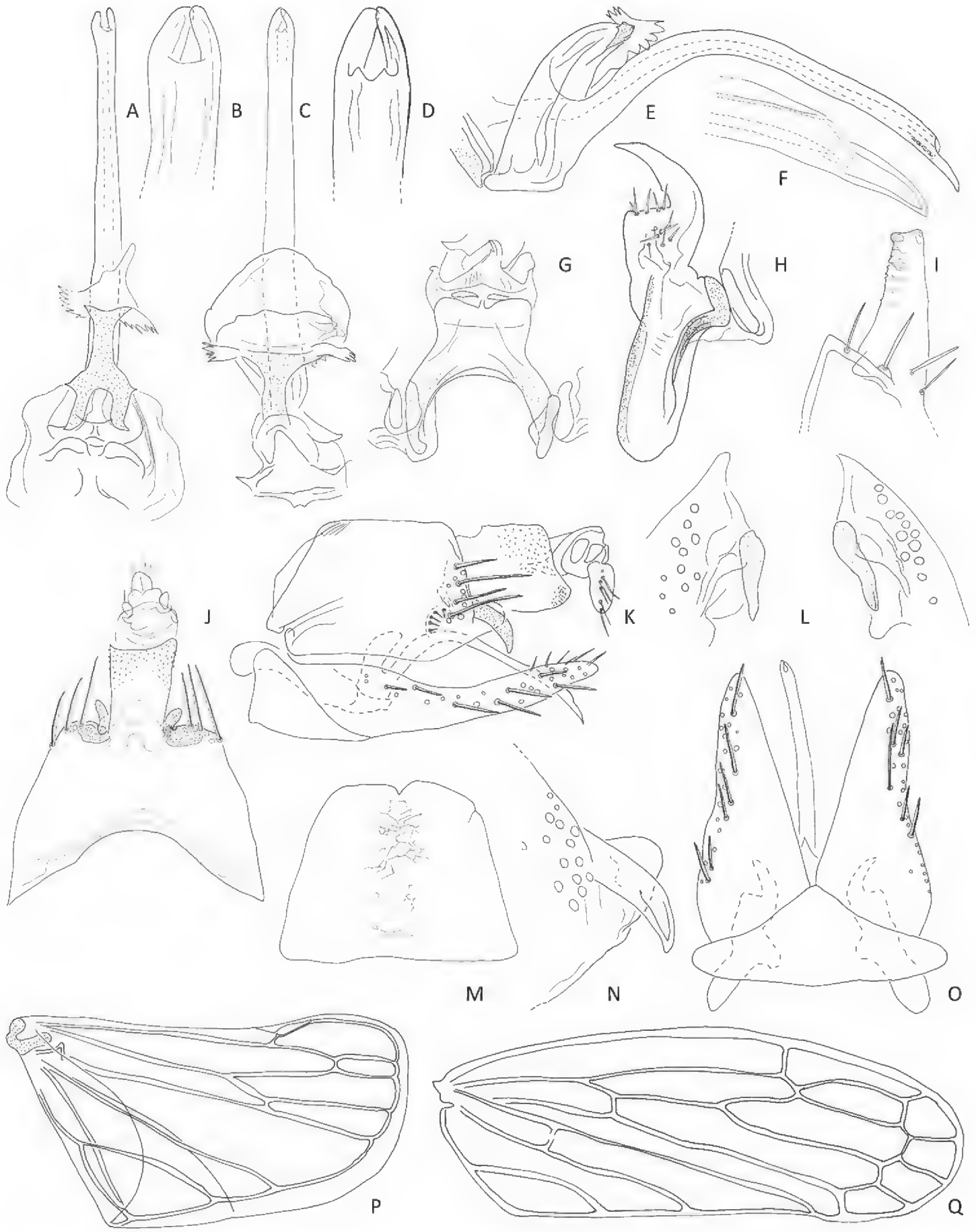

Figure 15. *Flavorubivolatus glabriverpus* gen. nov. & sp. nov. male genitalia, wings and ovipositor **A** aedeagus, dorsal **B** aedeagus, apex, ventral **C** aedeagus, dorsal **D** aedeagus, apex dorsal **E** aedeagus, lateral **F** aedeagus apex, lateral **G** connective **H** style **I** style, apex, lateral **J** genital capsule, dorsal **K** genital capsule, lateral **L** genital capsule, caudal **M** sternite 7 **N** pygofer lobe, process, lateral **O** subgenital plate **P** hind wing **Q** tegmina.

South Africa • 1♂, 1♀, 1 nymph; Northern Cape Province, Oorlogskloof, Doltuin; -31.4790, 19.0790; 19 Dec. 2016; M. Stiller leg.; sweeping; SANC Pretoria Dbase CCDL26687.

Diagnosis. Male with aedeagal shaft straight, ventrally at base with long (about half as long as shaft) paired tooth-like process (Figs 16A–D). Subgenital plate with apex broadly rounded (Fig. 16J). Pygofer lobe process short, sinuous, orientation medioposteriad (Fig. 16I, K, N). Female with sternite 7 transversely rectangular (Fig. 16M).

Male. Measurements. n=6. Length from apex of crown to apex of tegmina 3.15–3.34 mm. Crown median length 0.39–0.41 mm. Crown length next to eye 0.29–0.31 mm. Pronotum length 0.34–0.37 mm. Head width across eyes 0.94–0.98 mm. Pronotum width 0.86–0.89 mm. Ocellus diameter 27.0–34.2 μm; interocular distance 43.5–58.0 μm. Crown angle by trigonometry 98.6–101.4°.

Genitalia. Anal tube. Conical dorsally, square laterally. Incised about half way into pygofer (Fig. 16H, L).

Pygofer. Viewed laterally about as long as wide. Basal fold straight, angle about 45° (Fig. 16L).

Pygofer lobe. Apex broadly rounded, ventroposterior margin with medial and apical, membranous, disc-shaped structure. Sclerotized, short acuminate process on ventroposterior margin, orientation medioposteriad. Process sinuous, about 4 times longer than wide, with subapical ventral tooth, apices disjunct (Fig. 16H, K, N).

Subgenital plate. Apex narrowly rounded. Macrosetae 2–3 irregular rows. Ratio of length to width 1.6–1.8 times longer than basal width (Fig. 16J). Apex orientation posteriad (Fig. 16L).

Valve. Posterior margins broadly rounded (Fig. 16J).

Aedeagus. Base or subbase of shaft ventrally with elongate paired process, about half as long as shaft, parallel and contiguous with shaft; shaft sublinear. Gonopore elongate, subapical dorsally to ventromedially. Dorsal apodeme and preatrium subequal in length (Fig. 16A–D).

Connective. Ratio greatest length/greatest width=0.91–1.07, length stem/length arm=0.78–1.21, width stem/width arm=0.47–0.60 (Fig. 16F, G).

Style. Apophysis apex narrowly rounded. Preapical lobe rounded; anterior lateral arm with sides subparallel, apex narrowly rounded; arm 0.6 times longer than distal part (Fig. 16E).

Female. Measurements. n=4. Length from apex of crown to apex of tegmina 3.27–3.35 mm. Crown median length 0.41–0.42 mm. Crown length next to eye 0.30–0.32 mm. Pronotum length 0.36–0.37 mm. Head width across eyes 0.98–1.01 mm. Pronotum width 0.87–0.91 mm. Ocellus diameter 29.3–40.7 μm; interocular distance 56.0 μm. Crown angle by trigonometry 99.5–100.6°.

Genital capsule. Sternite 7. Ratio of greatest length: greatest width 0.63–0.70 (Fig. 16M).

Valvifer 1. Dorsal and ventral margins subparallel (Fig. 13C, F) or broadly rounded, asymmetric (Figs 13H, 14A, C, E). Anterior and posterior margins narrowly rounded. Elongated or about as long as wide.

Valvula 1. Sculpture maculose (Fig. 13I–K) and minimally strigate basally (Fig. 13K).

Valvifer 2. As in Fig. 13G.

Valvula 2. Apical half denticulate (Figs 13D, L, 14D), with fine serration in trough between crests (Fig. 14B).

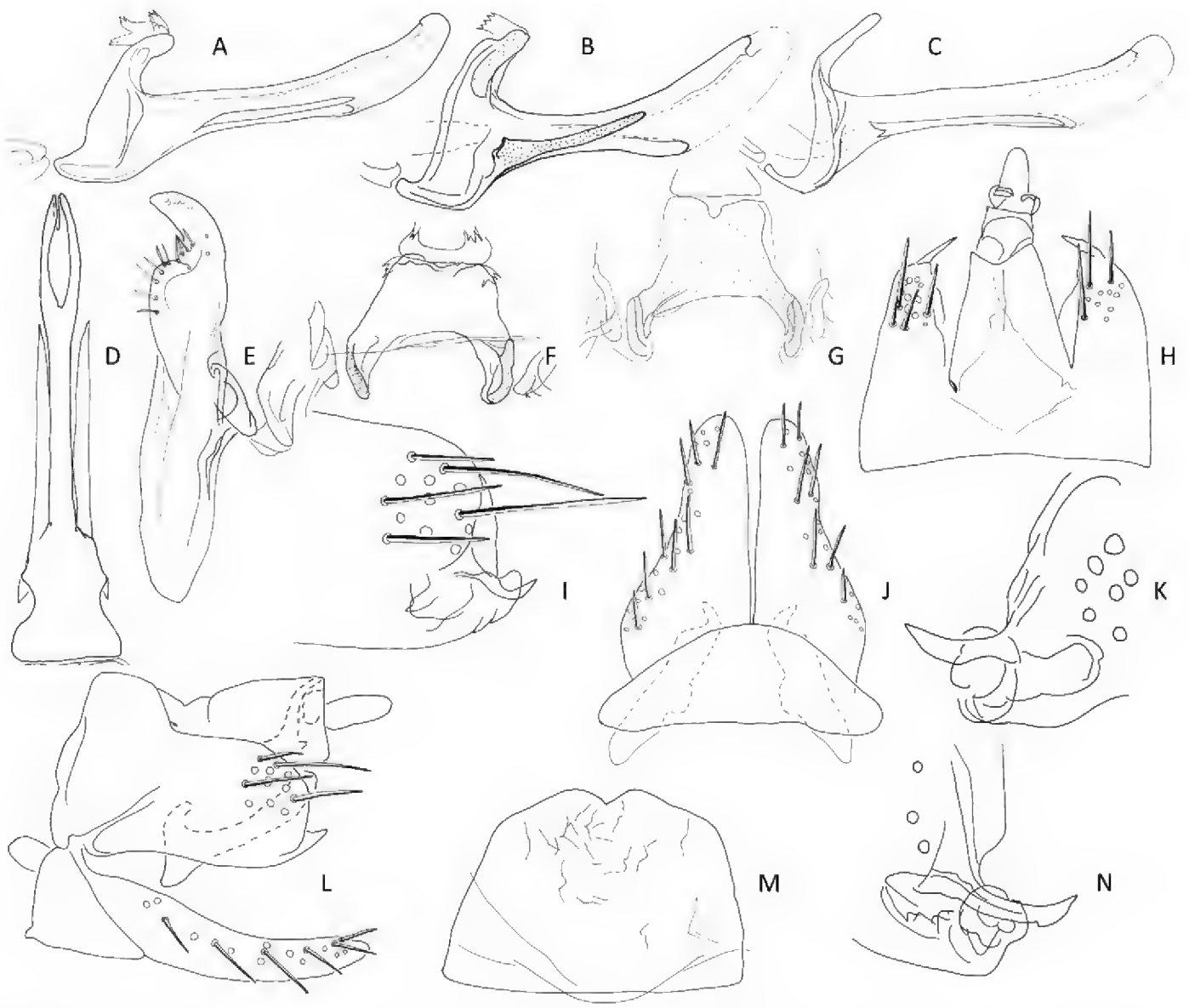

Figure 16. *Flavorubivolatus tensiverpus* gen. nov. & sp. nov. male genitalia and ovipositor **A** aedeagus, lateral, Clanwilliam **B** aedeagus, lateral, Doltuin **C** aedeagus, lateral, Clanwilliam **D** aedeagus, ventral, Clanwilliam **E** style **F** connective, Doltuin **G** connective, Clanwilliam **H** genital capsule, dorsal **I** pygofer lobe, lateral **J** subgenital plate **K** pygofer lobe, caudal **L** pygofer lobe, lateral **M** sternite 7 **N** pygofer lobe, caudal.

Valvula 3. Long setae subapically and submarginally (Fig. 14F).

Etymology. Named in Latin, adjective and noun in apposition, for the long, drawn out, *tensus*, spine on the shaft of the aedeagus (*verpa*). Gender Masculine.

Distribution. Cedarberg, Clanwilliam, Doltuin, Halfmanshof, Fig. 18B, red circle.

Discussion. *Flavorubivolatus tensiverpus* is distinctly more red in the crown, pronotum and tegmina than yellowish color of *F. glabriverpus*. Measurements show that the crown length medially is slightly shorter, i.e. 0.4 mm and in the other species 0.4–0.5 mm. Genitalia in the male with aedeagal shaft linear to sublinear, position and orientation of basal processes (Fig. 16A–C), especially in Halfmanshof specimen, where the processes are more basal, slightly shorter and the apex of the shaft slightly wider than in the other species of this genus (Fig. 16B, compare Fig. 16A, C, Clanwilliam). Arms of the connective appear asymmetrical, but this is due to orientation during examination (Fig. 16F, G). The connective arms and medial arms of the styles are angled dorsad. Dissections included 8 males and 4 females and signs of parasites absent, i.e. no larva inside abdomen or pupal case.

Plant records of *Phylica oleifolia* in Fig. 18D. A record of *Renosteria waverena* from Halfmanshof, with same date as above, but with clear differences in male genitalia and color to that of *F. tensiverpus*.

***Flavorubivolatus curtiverpus* sp. nov.**
http://zoobank.org/B62DC8F0-FCC4-489A-843C-70ED03AA9C74
Figures 11B–D, 17A–L

Material examined. Type locality: Republic of South Africa, Western Cape Province, Sederberge [Cedarberg], -32.13, 18.98, 12 Oct. 1971, J.G. Theron leg.

Type specimen. Holotype male, pinned, with genitalia in a separate microvial. Original label: "South Africa, Sederberge [Cedarberg], 12-10-71, J.G. Theron" "SANC Pretoria Dbase CCDL27862 (blue paper)".

Paratypes. 7♂♂, 1♀.

South Africa • 3♂♂, 1♀; ibid. holotype.

South Africa • 2♂♂; Western Cape Province, Cedarberg SE Citrusdal, Dwarsrivier Farm; -32.45, 19.2; 10–15 Oct. 2002; M. Stiller leg.; sweeping grass and forbs re-growth after fire; SANC Pretoria Dbase CCDL18272.

South Africa • 1♂; Western Cape Province, Cedarberg, SE Citrusdal, Driehoek Farm; -32.433, 19.216; 13 Oct. 2002; M. Stiller leg.; path the cedar wood forest sweeping low vegetation; SANC Pretoria Dbase CCDL27805.

South Africa • 1♂; Western Cape Province, Blinkberg Pass, -32.73, 19.43, 6 May 2011, M. Stiller leg.; SANC Pretoria Dbase CCDL28141.

Diagnosis. Aedeagal shaft straight, ventrally at base with very short, paired tooth-like process (Fig. 17C, D). Subgenital plate with apex truncated (Fig. 17H). Pygofer lobe process right-angled mediad, elongate, with apices contiguous (Fig. 17G, J), apices variably serrate (Fig. 17K, L). Female unknown.

Male. Measurements. n=7. Length from apex of crown to apex of tegmina 3.0–3.3 mm. Crown median length 0.4–0.5 mm. Crown length next to eye 0.3 mm. Pronotum length 0.4 mm. Head width across eyes 0.9–1.0 mm. Pronotum width 0.9 mm. Ocellus diameter 27.3–34.7 μm; interocular distance 44.3–57.7 μm. Crown angle by trigonometry 92.7–96.8°.

Genitalia. Anal tube. Conical dorsally, rectangular laterally. Incised about three quarters into pygofer (Fig. 17G, J).

Pygofer. Viewed laterally longer than wide (Fig. 17G). Basal fold straight, angled about 45° (Fig. 17G).

Pygofer lobe. Apex broadly rounded, medioposterior margin with medial and apical membranous disc-shaped structure (Fig. 17G, J). Compressed process on medioposterior margin, sclerotized, straight, long, orientation mediad (Fig. 17J–L). Process with apical and subapical ventral teeth; apices contiguous (Fig. 17K, L).

Subgenital plate. Apex truncated (Fig. 17H). Macrosetae in 2–3 irregular rows. Length to width 1.6–1.8 times longer than basal width at confluence of plate and valve. Apex orientation dorsoposteriad (Fig. 17G).

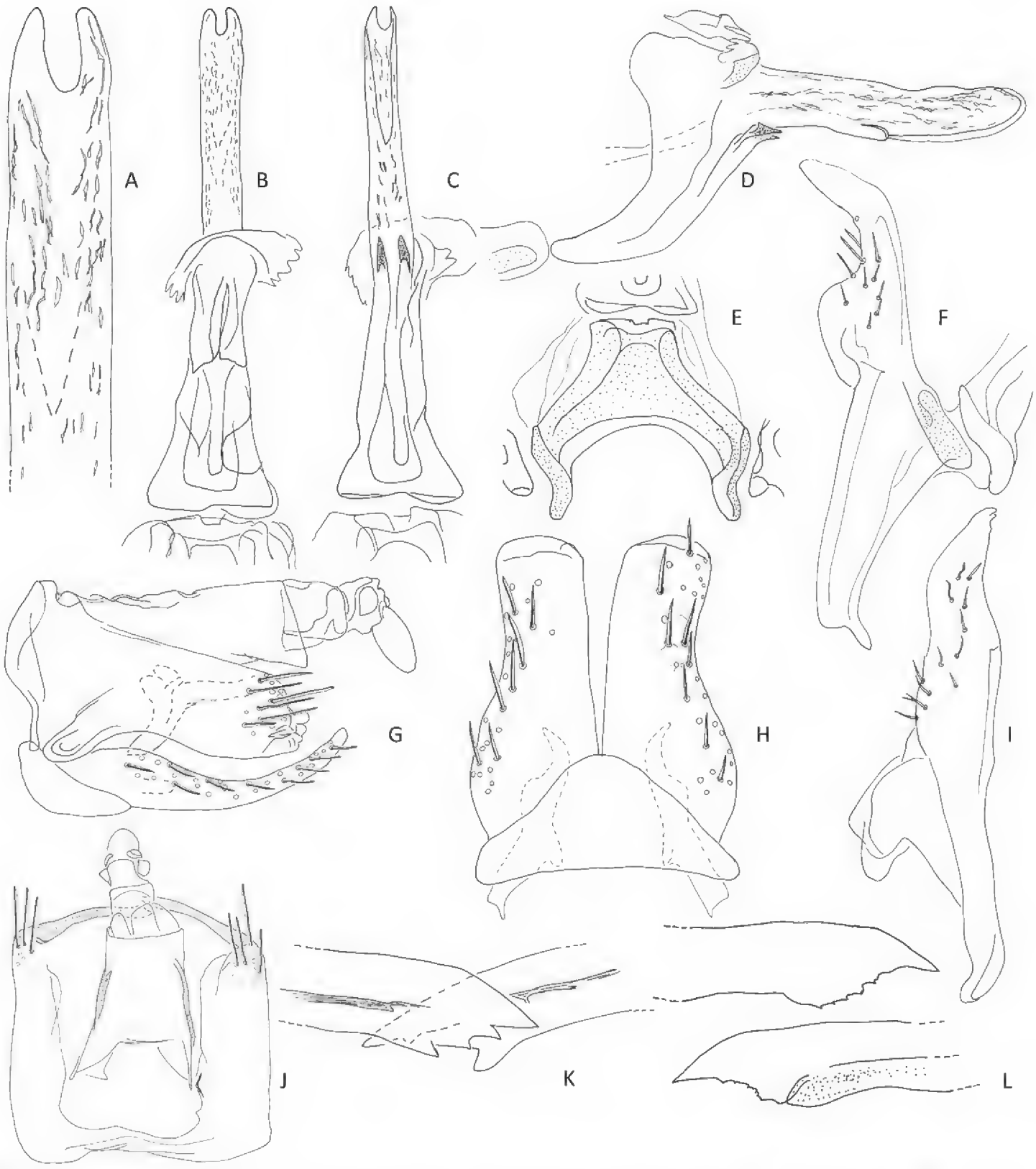

Figure 17. *Flavorubivolatus curtiverpus* gen. nov. & sp. nov. male genitalia **A** aedeagus, apex **B** aedeagus, dorsal **C** aedeagus, ventral **D** aedeagus, lateral **E** connective **F** style **G** genital capsule, lateral **H** subgenital plate, ventral **I** style, lateral **J** pygofer, dorsal **K** pygofer process, caudal, Sederberge **L** pygofer process, caudal, Dwarsrivier.

Valve. Posterior margins broadly rounded (Fig. 17H).

Aedeagus. Base of shaft ventrally with short paired acuminate process; length of process less than width of shaft. Shaft straight (Fig. 17B–D). Gonopore elongate, subapical dorsally to ventromedially (Fig. 17A, C). Shaft with striate microsculpture (Fig. 17A). Dorsal apodeme reduced, preatrium elongate (Fig. 17D).

Connective. Ratio stem length: greatest width 0.9 (Fig. 17E).

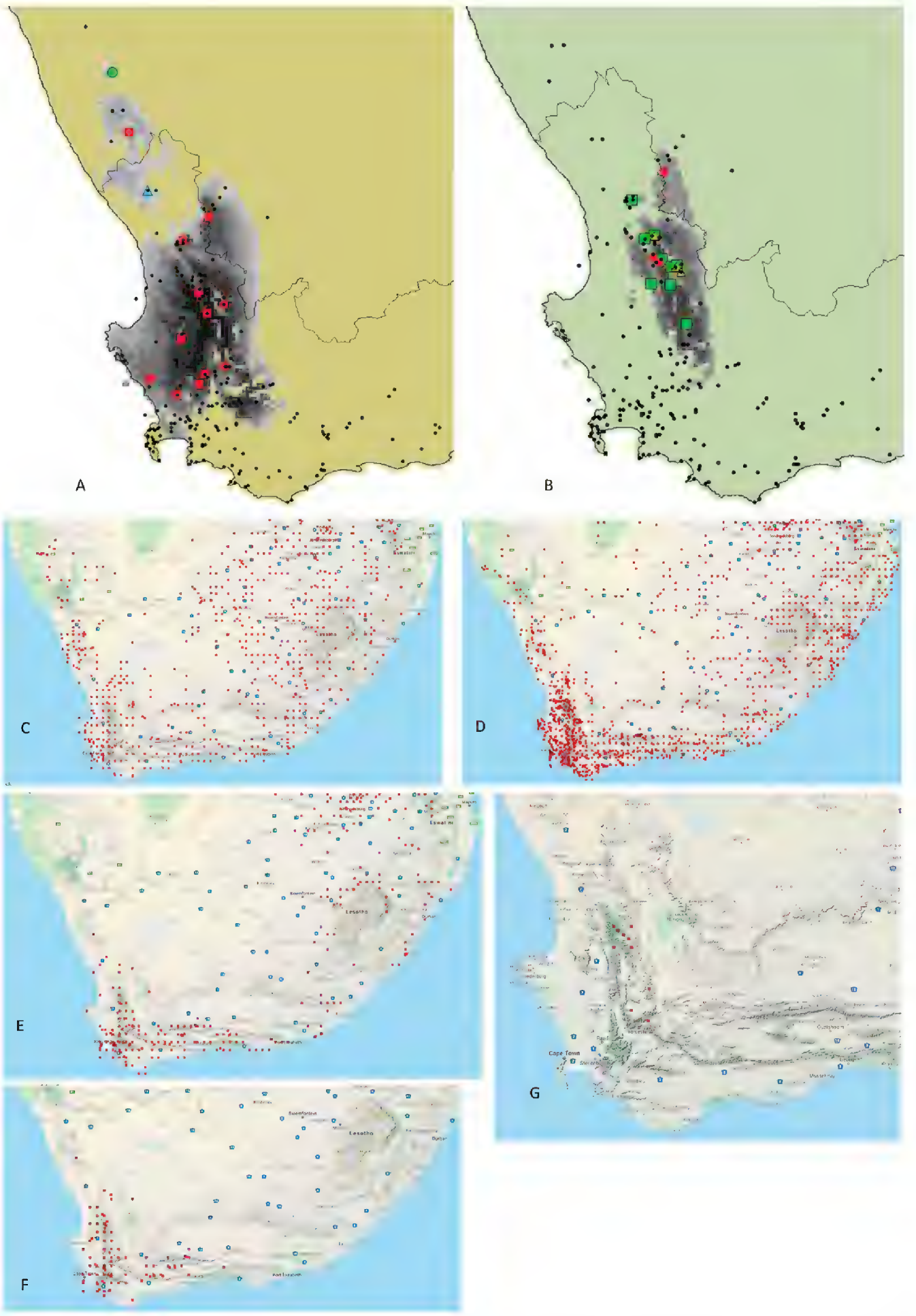

Figure 18. Distribution models for *Retevolatus* gen. nov. and *Flavorubivolatus* gen. nov. and distribution maps of some associated plants **A** potential natural distribution in south western part of South Africa (Western and Northern Cape Province), *R. flexiverpus* sp. nov., red square, *R. semicurviverpus* sp. nov., green circle, *R. subspiniverpus* sp. nov., blue triangle **B** potential natural distribution in south western part of South Africa (Western Cape Province), *Flavorubivolatus* spp, *F. glabriverpus* sp. nov., green square, *F. tensiverpus* sp. nov., red circle, *F. curtiverpus* sp. nov., yellow triangle **C** *Salvia lanceolata* **D** *Phylica oleifolia* **E** *Seriphium saxatilis* **F** *Myrovernix intricata* **G** *Selago pustulosa*.

Style. Apophysis apex narrowly rounded. Preapical lobe rounded; anterior lateral arm with sides convergent, apex acute; arm 0.4–0.6 times longer than distal part (Fig. 17F, lateral view Fig. 17I, macrosetae dorsal).

Female. Unknown.

Etymology. Latin, short, adjective and noun in apposition, *curtus*, for the short spine of the aedeagus, *verpa*. Masculine.

Distribution. Driehoek farm, Dwarsrivier, Sederberge, Fig. 18B, yellow triangle.

Discussion. The reddish color (Fig. 11B–D) is similar to the color of *F. tensiverpus* (Figs 11F–I, 12A) which distinguish these two species from *F. glabriverpus*, that is yellowish (Fig. 10A, E). Pygofer lobe processes variable in apical serration, i.e. length and number of teeth (Fig. 17K, L). The truncated, blunt apex of the subgenital plate and the elongated, transverse pygofer lobe process can clearly be distinguished on whole specimens (Fig. 11D), and that allow distinction between this species and *F. glabriverpus* and *F. tensiverpus*. The single female listed in material examined, (image in Fig. 10B) is tentatively included here. This species consists of a short series of males with overlapping records in one or other of the two species above. Signs of parasites or feminized specimens were absent, with all genitalia considered invariable, functional and distinct from *F. glabriverpus* and *F. tensiverpus*. All males were dissected. Records of an associated plant, *Selago pustulosa*, in Fig. 18G.

Distribution models

Distributions were modelled with the species from the most localities (i.e. *R. flexiverpus*) as well as most numerous species and all species merged, with the latter model for *Retevolatus* in Fig. 18A and for *Flavorubivolatus* in Fig. 18B, the former with a wider potential distribution. The first four Worldclim bioclimatic variables with the highest contribution to these models differed slightly. In *Retevolatus* they were bio19, 18, 8 and 15, and in *Flavorubivolatus* bio8, 15, 18 and 19. Bio8 is mean temperature in wettest quarter (winter), bio15 is precipitation seasonality, bio18 is precipitation in warmest quarter (summer) and bio19 is precipitation in coldest quarter (winter). Despite the wide distribution of some of the associated plants (Fig. 18C–G), the range of these leafhoppers appears restricted to a small area. Personal observation of species on plants resembling *Seriphium saxatilis* in the northern parts of South Africa have not produced specimens of *Flavorubivolatus*. Extensive work on the leafhoppers associated with *Dicerothamnus rhinocerotis* by Theron has not shown that *Flavorubivolatus* was associated with this plant.

Conclusions

Although the new genera described here are placed in Bonaspeiini this placement is not fully resolved due to the ambiguous definitions of Bonaspeiini and Athysanini in Zahniser and Dietrich (2013) which bear a number of similarities. The attempt here and previously (Stiller 2019a, b, 2020) was to better quantify dimension of parts such as the anal tube, connective and style. At present three configurations of wings are recog-

nized in genera included in Bonaspeiini, i.e. tegmina covering abdominal segments 2–3, hind wing reduced (*Basutoia*, *Bretega*, *Tzitzikamaia*); tegmina covering up to abdominal segments 7–9, hind wing reduced, narrower or shorter than tegmina (*Bloemia*, *Bonaspeia*, *Caffrolix*, *Cerus*, *Colistra*, *Curvostylus*, *Gcaleka*, *Hadroca*, *Johanus*, *Kaapia*, *Megaulon*, *Proekes*, *Proekoides*, *Refrolix*, *Salsocolila*, *Salsolibia*); tegmina extended beyond abdomen, hind wing as long as tegmina and with functional jugal lobe (*Capeolix*, *Discolopeus*, *Geelus*, *Flavorubivolatus*, *Kimbella*, *Renosteria* and *Retevolatus*); at present alary polymorphism has not been observed in these genera. An additional character which may be useful in grouping species is the presence or absence and position of the pygofer process; in some groups the process is marginal or medial with further subcategories for both such as dorsal, apical and ventral. Properties of the pygofer process such as denticulation, curvature and orientation appear unsuited for generic categories. The anal tube, connective, style and aedeagus require further investigation towards contribution of tribal placement.

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Appendix 1.

Table A1. Specimen and species records.

Genus species	AccN0	males	females	country	province	locality	Lat_Dec/Lon_Dec	Date	collector	plant	family
Retevolatus flexiverpus gen. nov. & sp. nov.	CCDL27849	1		South Africa	Western Cape Province	Olifants River between Citrusdal and Clanwilliam	-32.36, 18.95	1931/10/15	SA Museum Staff		
Retevolatus flexiverpus gen. nov. & sp. nov.	CCDL27850	17	4	South Africa	Western Cape Province	Piketberg	-32.9, 18.75	1971/10/26	J.G. Theron		
Retevolatus flexiverpus gen. nov. & sp. nov.	CCDL27847	6	5	South Africa	Western Cape Province	Citrusdal	-32.6, 19.05	1971/11/09	F. Honibal		
Retevolatus flexiverpus gen. nov. & sp. nov.	CCDL27842		1	South Africa	Western Cape Province	Slagboom Farm Agter Witsenberg	-33.23, 19.2667	1973/01/06	J.G. Theron		
Retevolatus flexiverpus gen. nov. & sp. nov.	CCDL27848	2	2	South Africa	Western Cape Province	Citrusdal	-32.6, 19.05	1973/11/05	F. Honibal		
Retevolatus flexiverpus gen. nov. & sp. nov.	CCDL27845	3	1	South Africa	Western Cape Province	Gouda	-33.31, 19.03	1974/10/30	J.G. Theron		
Retevolatus flexiverpus gen. nov. & sp. nov.	CCDL27846	3		South Africa	Western Cape Province	Hermon	-33.43, 18.96	1974/10/30	J.G. Theron		
Retevolatus flexiverpus gen. nov. & sp. nov.	CCDL27853	9	7	South Africa	Western Cape Province	Klipheuwel	-33.56, 18.7	1974/11/24	J.G. Theron	*Maytenus heterophylla*	Celastraceae
Retevolatus flexiverpus gen. nov. & sp. nov.	CCDL27854	1	11	South Africa	Western Cape Province	Garies Kamiesberg	-30.46, 18.13	1976/10/15	J.G. Theron		
Retevolatus flexiverpus gen. nov. & sp. nov.	CCDL27844	7	6	South Africa	Western Cape Province	Clanwilliam Cedarberg	-32.5, 19.25	1976/12/21	J.G. Theron		
Retevolatus flexiverpus gen. nov. & sp. nov.	CCDL27843	2	2	South Africa	Western Cape Province	Darling	-33.37, 18.38	1981/12/18	J.G. Theron		

Genus species	AccN0	males	females	country	province	locality	Lat_Dec/Lon_Dec	Date	collector	plant	family
Retevolatus flexiverpus gen. nov. & sp. nov.	CCDL18349		2	South Africa	Western Cape Province	Wiedouw Farm base of Gifberg Pass	-31.73, 18.766	2002/10/03	M. Stiller	*Salvia lanceolata*	Lamiaceae
Retevolatus flexiverpus gen. nov. & sp. nov.	CCDL18350	1		South Africa	Western Cape Province	Wiedouw Farm base of Gifberg Pass	-31.73, 18.766	2002/10/03	M. Stiller	*Diosma hirsuta*	Rutaceae
Retevolatus flexiverpus gen. nov. & sp. nov.	CCDL18351		1	South Africa	Western Cape Province	Wiedouw Farm base of Gifberg Pass	-31.73, 18.766	2002/10/03	M. Stiller	*Phylica oleifolia*	Rhamnaceae
Retevolatus flexiverpus gen. nov. & sp. nov.	CCDL18352	1		South Africa	Western Cape Province	Wiedouw Farm base of Gifberg Pass	-31.73, 18.766	2002/10/03	M. Stiller	*Passerina truncata* subsp. *truncata* and sweeping trees and shrubs at night	Thymelaeaceae
Retevolatus flexiverpus gen. nov. & sp. nov.	CCDL18347	1		South Africa	Northern Cape Province	Doring River waterfall N Nieuwoudtville	-31.32, 19.116	2002/10/07	M. Stiller	*Galenia africana*	Aizoaceae
Retevolatus flexiverpus gen. nov. & sp. nov.	CCDL27851	5	6	South Africa	Northern Cape Province	Brakwater Oorlogskloof	-31.47, 19.079	2016/12/17	M. Stiller	*Diospyros austro-africana*	Rhamnaceae
Retevolatus semicurviverpus gen. nov. & sp. nov.	CCDL18345	12	10	South Africa	Northern Province	Biesiesfontein Farm S Springbok	-29.75, 17.933	2002/09/29	M. Stiller	*Searsia undulata*	Anacardiaceae
Retevolatus semicurviverpus gen. nov. & sp. nov.	CCDL18346	1		South Africa	Northern Province	Biesiesfontein Farm S Springbok	-29.75, 17.933	2002/09/29	M. Stiller	light trap	
Retevolatus subspiniverpus gen. nov. & sp. nov.	CCDL27852	30	16	South Africa	Western Cape Province	Nuwerus	-31.14, 18.35	1971/11/10	J.G. Theron		

Table A2. Specimen and species records.

Genus species	AccN0	males	female	nymph	country	province	locality	Lat_Dec/Lon_Dec	BeginDate	EndDate	collector	plant	family
Flavorubivolatus glabriverpus gen. nov. & sp. nov.	CCDL27822	7	9		South Africa	Western Cape Province	Sederberg	-32.13, 18.98	1971/10/12		J.G. Theron		
Flavorubivolatus glabriverpus gen. nov. & sp. nov.	CCDL27825	1			South Africa	Western Cape Province	Clanwilliam	-32.16, 18.88	1978/08/10		J.G. Theron		
Flavorubivolatus glabriverpus gen. nov. & sp. nov.	CCDL27804	4	9		South Africa	Western Cape Province	Clanwilliam Cedarberg	-32.5, 19.25	1976/12/21		J.G. Theron		
Flavorubivolatus glabriverpus gen. nov. & sp. nov.	CCDL47826	4	1		South Africa	Western Cape Province	Piekenierskloof	-32.62, 18.95	1983/01/18		J.G. Theron		
Flavorubivolatus glabriverpus gen. nov. & sp. nov.	CCDL27827	2	3		South Africa	Western Cape Province	Bokfontein	-33.03, 19.31	1985/03/08		J.G. Theron	*Metalasia muricata*	Asteraceae
Flavorubivolatus glabriverpus gen. nov. & sp. nov.	CCDL27828	2	1		South Africa	Western Cape Province	Middelberg, Citrusdal	-32.63, 19.15	1985/03/09		J.G. Theron	*Elytropappus scaber*	Asteraceae
Flavorubivolatus glabriverpus gen. nov. & sp. nov.	CCDL27830		1		South Africa	Western Cape Province	Clanwilliam, Algeria Forest Station	-32.373, 19.057	1985/03/09		J.G. Theron		
Flavorubivolatus glabriverpus gen. nov. & sp. nov.	CCDL27823	2			South Africa	Western Cape Province	Cedarberg, Eikeboom	-32.45, 19.16	1985/03/09		J.G. Theron	*Elytropappus scaber*	Asteraceae
Flavorubivolatus glabriverpus gen. nov. & sp. nov.	CCDL18270	12	19		South Africa	Western Cape Province	Gifberg Pass Summit Vanrhynsdorp	-31.77, 18.76	2002/10/09		M. Stiller	*Myrovernix* sp.	Asteraceae
Flavorubivolatus glabriverpus gen. nov. & sp. nov.	CCDL18271	2	7	3	South Africa	Western Cape Province	Dwarsrivier Farm Cedarberg SE Citrusdal	-32.45, 19.2	2002/10/10	2002/10/15	M. Stiller	*Myrovernix intricata*	Asteraceae
Flavorubivolatus glabriverpus gen. nov. & sp. nov.	CCDL18273	6	14	10	South Africa	Western Cape Province	Driehoek Farm Cedarberg SE Citrusdal	-32.433, 19.216	2002/10/13		M. Stiller	*Myrovernix* spp. and *Seriphium saxatilis*, plants mostly sterile, intertwined	Asteraceae

Genus species	AccN0	males	female	nymph	country	province	locality	Lat_Dec/Lon_Dec	BeginDate	EndDate	collector	plant	family
Flavorubivolatus tensiverpus gen. nov. & sp. nov.	CCDL27824	6	3		South Africa	Western Cape Province	Cedarberg near Clanwilliam	-32.35, 18.98	1976/12/21		J.G. Theron		
Flavorubivolatus tensiverpus gen. nov. & sp. nov.	CCDL27829	1	1		South Africa	Western Cape Province	Halfmanshof	-33.14, 18.96	1981/12/17		J.G. Theron		
Flavorubivolatus tensiverpus gen. nov. & sp. nov.	CCDL27831	1			South Africa	Western Cape Province	Cedarberg wilderness #1	-32.4, 19.037	2016/12/14		M. Stiller	*Eriocephalus* sp.	Asteraceae
Flavorubivolatus tensiverpus gen. nov. & sp. nov.	CCDL26687	1	1	1	South Africa	Northern Cape Province	Doltuin Oorlogskloof	-31.479, 19.079	2016/12/19		M. Stiller	*Phylica plumigera*, male on *Eriocephalus* sp. Asteraceae	Rhamna-ceae
Flavorubivolatus curtiverpus gen. nov. & sp. nov.	CCDL27862	4	1		South Africa	Western Cape Province	Sederberge	-32.13, 18.98	1971/10/12		J.G. Theron		
Flavorubivolatus curtiverpus gen. nov. & sp. nov.	CCDL18272	2			South Africa	Western Cape Province	Dwarsrivier Farm Cedarberg SE Citrusdal	-32.45, 19.2	2002/10/10	2002/10/15	M. Stiller	*Selago pustulosa*	Scrophu-lariaceae
Flavorubivolatus curtiverpus gen. nov. & sp. nov.	CCDL27805	1			South Africa	Western Cape Province	Driehoek Farm Cedarberg SE Citrusdal	-32.433, 19.216	2002/10/13		J.G. Theron	low vegetation	
Flavorubivolatus curtiverpus gen. nov. & sp. nov.	CCDL28141	1			South Africa	Western Cape Province	Blinkberg Pass	-32.73, 19.43	2011/05/06		M. Stiller		